

Exhibit 3

the interwar period (1945 to 1950), the Korean War, and the years from 1953 to 1964 and any relationships between the Government, its various agencies, and the Natural Products Refining Company and the Columbia Southern Chemical Company plant in Jersey City, NJ during that time.

5. Attachment 1 hereto is a true and accurate copy of my initial Expert Report, dated October 7, 2016, which contains my findings, conclusions, and opinions concerning pertinent aspects of Government relations with the Natural Products Refining Company and the Columbia Southern Chemical Company specifically before and during the relevant periods and the chrome chemical industry generally during those years.

6. On page 79 of Attachment 1, I omitted a word from the second sentence of the first full paragraph. The sentence should read, "I have found no documentation showing that Natural Products purchased ore from an agency of the Federal Government during the Korean War."

7. Attachment 2 hereto is a true and accurate copy of my Rebuttal Report and attachments, dated January 6, 2017, which contains my findings, conclusions, and opinions in rebuttal of expert reports offered by PPG's experts.

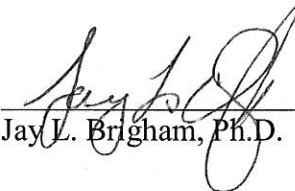
8. My expert reports provide the opinions to which I would testify in this case, along with an explanation of the basis for them and a full statement of the sources and materials upon which I relied upon in conducting my work.

9. I declare under penalty of perjury that my statements, conclusions, and opinions in my October 7, 2016, Initial Report and my January 6, 2017 Rebuttal Report, and associated table of contents, figures, and attachments in those reports, are true and correct.

10. The United States will be filing as exhibits in its Statement of Material Facts and/or Memorandum in Support of its Motion for Summary Judgment in this case some of the historic documents I cited and relied upon in preparing my Reports. I have reviewed copies of the exhibits that were cited in my Reports and declare under penalty of perjury that these exhibits consist of true and correct copies of the historic documents, or pertinent portions of these historic documents, the originals of which are at least 20 years old, that I cited and relied upon in preparing my Reports.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge, information and belief.

Dated this 27 day of February 2018.



Jay L. Brigham, Ph.D.

Attachment 1


**An Expert Witness Report Concerning the Natural Products
Refining Company and Columbia-Southern Chemical Company,
1909-1964**

PPG Industries, Inc., v. The United States of America

(No. 2:12-CV-0352 (KM)(MF))

(District of New Jersey)

Prepared by



**Jay L. Brigham, Ph.D., Managing Partner
Morgan, Angel and Associates, L.L.C.
Washington, DC
October 7, 2016**

Table of Contents

I.	Introduction	1
II.	Chromite and the Natural Products Refining Company	1
	A. Chromite Types and Sources	1
	B. The Natural Products Refining Company: 1909 through 1939	2
III.	World War I and Natural Products Refining Company	5
	A. Introduction	5
	B. United States Policy toward the War Before April 1917	5
	C. The United States Economy during Direct American Involvement in World War I	7
	1. The War Industries Board (WIB)	7
	2. World War I Priority System	9
	3. WIB Conservation Division and Advisory Committees	9
	4. Chemicals and Chromite	11
	5. Labor during World War I	12
	6. Food, Fuel, and Shipping	13
	7. Alleged Ore and Chemical Price Controls	15
	D. NPRC during WWI	16
	E. Conclusions Relating to NPRC during World War I	16
IV.	1919 through the “Defense Period” (November 1941)	19
	A. Chromite Use and NPRC	19
	1. Increased Chromite Use	19
	2. Natural Products in the 1920s and 1930s	20
	B. Pre-World War II Planning Agencies and Actions	22

1. The Army-Navy Munitions Board (ANMB)	22
2. 1939 Industrial Mobilization Plan and Neutrality Laws	23
3. President Roosevelt, Critical Materials, Limited National Emergency, and First Steps Toward Economic Mobilization	24
4. The End of the “Phony War” and the United States Responses	26
5. The Selective Training and Service Act of 1940	34
6. Toward More Centralized Federal Economic Planning: OPM and SPAB	37
C. Chromium Preference and Allocation Orders	39
1. Order M-18, Order M-18-a and Order M-18-b	39
2. General Allocation Order M-300, Schedule 62	41
3. Order M-63 and Order M-370	41
V. America at War	42
A. Additional Statutory and Executive Order Authority	42
1. The First War Powers Act	42
2. The War Production Board	43
3. The Second War Powers Act	49
4. Labor Regulations and Policies during World War II	50
5. Certificates of Necessity	51
B. Continued Shortages of Chromate Chemicals and Proposals for Increased Production	52
C. OPA Maximum Price Regulations-Numbers 188, 258 and 575	57
D. Sources from which NPREC Bought Chromite	61
E. NPREC Operations, Executive Personnel, and Waste Management during World War II	63

F. Labor Shortage at the NPRC and Other Chromate Plants during World War II	64
G. Industrial Hygiene in the Sodium Bichromate Industry	66
H. Conclusions Relating to NPRC during World War II	70
VI. The United States, Chromium Production, and Natural Products Refining Company: 1946-1964	73
A. Post-World War II Federal Agencies, Laws and Regulations: 1946-1950	73
1. Regulatory Rollback	73
2. The National Security Act of 1947	74
3. Stockpiling Efforts 1945-1950	75
B. The Korean War: 1950-1953	78
1. Introduction	78
2. The National Production Act	78
3. Stockpiling, the Defense Minerals Administration, and Proposed Chromite Allocation Order during the Korean War	79
4. The End of the Korean War	81
5. Industrial Hygiene and Worker Safety at NPRC between the End of World War II and the End of the Korean War	81
C. The Natural Products Refining Company and the Columbia Southern Chemicals Company: 1954-1964	85
1. Pittsburgh Plate Glass Company's Purchase of NPRC	85
2. Industrial Hygiene and Worker Safety Matters at CSCC	91
D. Conclusions Relating to NPRC and CSCC from 1946-1963	100

I. Introduction

I have prepared this expert witness report at the request of the Environmental Defense Section of the Environment and Natural Resources Division of the United States Department of Justice. A representative of the Environmental Defense Section first contacted me in March 2013 regarding this case. Subsequently, Morgan, Angel and Associates, LLC (Morgan Angel) and I, as the expert witness, signed a contract with the Department of Justice to review historical documents and write an expert witness report regarding that Natural Products Refining Company's plant in Jersey City, NJ.

This report is based on the extensive information that I have reviewed to date. I may revise and supplement the opinions expressed here as I review any additional documents produced by the parties in this case, the reports by other experts here, and the testimony of other experts in this matter.

I hold a doctoral degree in United States history with an emphasis on twentieth-century American history. Morgan, Angel and Associates, LLC is compensated at the rate of \$142.00 per hour for my services. I have given expert testimony in United States District Courts (District of Kansas, District of New Jersey, Central District of California, District of South Carolina, Western District of Washington, and Southern District of California) and the United States Court of Federal Claims. I have attached my resume as Attachment 1 and a list of cases in which I was either deposed or testified in as Attachment 2. Documents that I considered but did not cite in this report are in Attachment 3.

II. Chromite and the Natural Products Refining Company

A. Chromite Types and Sources

Chromite is an ore and the only known source of chromium. Just prior to World War I, chromite mining in the United States was limited to California and Oregon. Most chromite used in the United States before World War I originated in Turkey and New Caledonia. Other areas with chromite deposits included Greece, Russia, India, and the region then known as Rhodesia. A 1918 publication on chromite noted four end uses for chemicals derived from the processed ore: (1) As an alloy hardening and toughening steel; (2) As a heat and acid-resisting lining for steel furnaces; (3) For making dyes to color cloth (as, for instance, khaki); and (4) For the manufacture of chemicals used in the tanning of leather.¹ These metallurgical, refractory, dye,

¹ *Chromite* (San Francisco: Mining and Scientific Press, 1918), USNPR0001113-30 at USNPR0001116.

and leather tanning uses for these chemicals, as well as the manufacture of other chromium chemicals from them, continued throughout the relevant period in this case.²

Chromite ore fell into one of three classes depending on the percentage of chromite oxide the ore contained. Metallurgical ore used in stainless steel and steel alloys contained between 48 and 50 percent chromite oxide. Refractory ore used for materials to line furnaces could contain as little as 30 percent chromite oxide. Chromite ore for chemical use could vary widely in its oxide content, although manufacturers preferred higher percentage ore because of cost savings.³ Manufacturing sodium bichromate involved several steps. Workers heated chromite with lime and then added water containing soda ash. When the liquid dried and crystallized, sodium bichromate formed. The addition of sulfuric acid to the mix also produced sodium bichromate.⁴

Throughout the relevant period in this litigation, the primary product of NPPRC and then PPG's Columbia Southern at the Garfield Avenue plant was sodium bichromate, whose primary uses remained "tanning, pigment production, chromic acid manufacture, metal treatment, textile processing, and chemical and dye manufacture."⁵

B. The Natural Products Refining Company: 1909 through 1939

In June 1909, Henry Goman founded the Natural Products Refining Company (Natural Products / NPPRC) and served as company president until his death in October 1945. The NPPRC of Jersey City, NJ engaged in the manufacture of chemicals for dyeing cloth and tanning leather, primarily producing sodium bichromate.⁶ First incorporated under New York laws, NPPRC began operations in 1909 at 902 Garfield Avenue in Jersey City, NJ where they continued until NPPRC's purchaser, the Pittsburgh Plate and Glass Company, sold the property in 1964. In 1917, the company reorganized under New Jersey laws, while retaining the same corporate name. Six

² Acting Secretary of State to Ambassador in France, 10/31/1944, PPGNPR0961167; *Critical Materials and Products*, 7/1/1945, PPGNPR0029101-06 at 106; Civilian Production Administration, *Facts for Industry, Sodium Bichromate in the War Program*, 1/4/1947, PPGNPR0010674; Defense Production Administration, Chromite - Chemical Grade, 6/4/1951, PPGNPR0029311-12; Munitions Board Meeting 3/17/1949, PPGNPR0029318-20; Pittsburgh Plate Glass Company, *Seventy-first Annual Report, 1954*, USNPR0006414-36 at USNPR0006423, USNPR0006424; Columbia-Southern Chemical Corporation, 65 TPD Sodium Bichromate Plant for Corpus Christi, Texas with Product Terminal at Jersey City, New Jersey, PPGNPR0032491-507 at 493; Transcript of Proceedings, Jersey City Redevelopment Authority v. PPG Industries, Et al. Civil No. 85-2014, United States District Court for the District of New Jersey, 7/1/1987, PPGNPR0067685-905 at PPGNPR006776-78.

³ Supply Priorities and Allocation Board Minutes, "Chromite," 12/12/1941, USNPR0006726-45 at USNPR0006728.

⁴ *Mineral Resources of the United States, 1917* (Washington, D.C.: Government Printing Office, 1920), USNPR0009099-118 at USNPR0009110; and *Mineral Resources of the United States, 1918* (Washington, D.C.: Government Printing Office, 1921), USNPR0009119-140 at USNPR0009125.

⁵ *Critical Materials and Products*, 7/1/1945, PPGNPR0029101-106 at PPGNPR0029106.

⁶ *Mineral Resources of the United States, 1917*, USNPR0009099-118 at USNPR0009110; and *Mineral Resources of the United States, 1918*, USNPR0009119-140 at USNPR0009125.

years later, reorganization again occurred under Delaware law. Under the terms of the December 1923 reorganization, NPRC authorized \$1 million to be designated as capital stock, of which 2,000 shares was preferred stock and 8,000 shares common stock. Shares in each class were worth \$100.00.⁷

NPRC was preceded in Jersey City by another chromate chemicals manufacturer – the Mutual Chemical Company. The New Jersey Department of Environmental Protection concluded in a 1991 administrative Directive, based on a letter from Mutual, that Mutual had begun operations in 1895 almost fifteen years prior to NPRC.⁸ The 1906 Industrial Directory for New Jersey stated that as of that time, the Mutual Chemical Co. of New Jersey was operating with 55 employees in Jersey City.⁹

Several Sanborn Insurance Maps show NPRC property. A 1911 Sanborn Insurance Map of Jersey City, NJ, shows the NPRC on the 900 block of Garfield Avenue. Garfield Avenue formed the western boundary of the property while the Morris Canal served as the eastern one. To the south were Jane Street and another parcel of land, while to the north were railroad tracks. The 1911 Sanborn map shows five buildings and a railroad siding on NPRC property.¹⁰

On the 1896 Sanborn Insurance Map, to the east of what became NPRC property, was the Morris Canal. The canal's towpath was on the east side of the canal. Just beyond the towpath was Canal Street.¹¹ The Morris Canal and towpath also appear on the 1911 Sanborn Map,

⁷ Natural Products Refining Corp. to S. Manian, 5/31/1946, PPGNPR0813042; New York Stock Exchange, Department of Stock List, Pittsburgh Plate Glass Company, 7/15/1954, PPGNPR0089439-49 at 47; Columbia-Southern Chemicals, vol. 2, no. 3, Fall 1957, pp. 20-23, PPGNPR0033416-20 at 18; Proposed News Release, Jersey City Shutdown, 4/23/1963, PPGNPR0069010; Answers by Defendant, PPG Industries, Inc. to Interrogatories from Cliff and Associates and Lawrence Construction Co., Jersey City Redevelopment Authority v. PPG Industries, Et al. Civil No. 85-2014, United States District Court for the District of New Jersey, 8/5/1986, PPGNPR0144389-422 at 408; Sidetrack Agreement, Central Railroad Company of New Jersey and Natural Products Refining Company, 1/11/1944, PPGNPR0725289-92 at 91; *New York Times*, "Henry Anderson Goman, Founder and Head of Natural Products Refining Company," 10/17/1945; New York Stock Exchange, Pittsburgh Plate Glass Company, 7/15/1954, PPGPR0139837; *Mineral Resources of the United States, 1917*, USNPR0009099-118 at USNPR0009110; *Mineral Resources of the United States, 1918*, USNPR0009119-140 at USNPR0009125; and Certificate of Incorporation of Natural Products Refining Company, 12/27/1923, PPGNPR0139837-46. The October 1945 *New York Times* obituary incorrectly states that NPRC started operations around 1915.

⁸ Hudson County Chromate Chemical Production Waste Sites Remedial Investigation and Feasibility Study Directive and Notice to Insurers, 4/4/1991, PPGNPR0168466-88 at PPGNPR0168471, PPGNPR0168474; 1908 Map of Jersey City New Jersey, USNPR0039809, 1908 Map of Jersey City, New Jersey, Vol. 1, Plate 19, USNPR0039810, 1908 Map of Jersey City, New Jersey, Vol. 1, Plate 20, USNPR0039811, 1908 Map of Jersey City, New Jersey, Vol. 1, Plate 21, USNPR0039812, 1908 Map of Jersey City, New Jersey, Vol. 1, Plate 22, USNPR0039813, 1908 Map of Jersey City, New Jersey, Vol. 1, Plate 25, USNPR0039814, 1908 Map of Jersey City, New Jersey, Vol. 1, Plate 28, USNPR0039815,

⁹ Winton C. Garrison, *Industrial Directory of New Jersey*, (Trenton, NJ, 1906), USNPR009273-79 at USNPR009276.

¹⁰ 1911 Certified Sanborn Map, 900 Garfield, Jersey City, NJ, USNPR0009094.

¹¹ 1896 Certified Sanborn Map, 900 Garfield, Jersey City, NJ, USNPR0009095.

although Canal Street had been renamed Valley.¹² Sometime during the next several decades, the Morris Canal was filled in and the Lehigh Valley Railroad Company purchased the property. In April 1939, NPRC purchased 773 feet of old canal property with a width of sixty feet from the railroad tracks adjacent to its eastern boundary.¹³

When NPRC started production in 1909, workers used a “hand-operated coal-fired refractory” furnace. In June 1916, a trade publication reported that NPRC had completed a \$50,000 expansion of its plant. Sometime in the early 1930s, the company installed the first of three oil-burning kilns. Additional building construction also occurred. In 1934, building twenty, a treatment building, was built. Four years later, the company erected a building to house various manufacturing activity. In 1937 and 1940, the company had oil-burning boilers installed.¹⁴

The Morris Canal ran between the Hudson River and the Hackensack River and opened in 1836. It was approximately 8 miles long. The main boat/barge channel was built to be 40 feet wide at the top, 20 feet wide at the bottom, and 5 feet deep. Basins and wider sections of the Canal were constructed at specific locations to facilitate multiple boat maneuvers. Boat traffic on the Canal ended around 1912; and the Canal was closed and drained in 1924.¹⁵

No NPRC business records have been found relating to how and where the company’s manufacturing wastes were handled. However, the analysis of contemporary published maps and aerial photographs shows that the Morris Canal was filled in the 1920s and 1930s. In a March 1991 deposition in other litigation against PPG, a former NPRC and CSCC executive, E. Warren Fairbanks, testified that NPRC personnel used chemical manufacturing wastes to fill in the old Morris Canal, and that this was occurring when he first came to work there in 1933, and continued over a period of years. He did not remember whether that practice continued up to World War II or after World War II.¹⁶ No evidence has been found that any agency of the United States had any role in that activity.

¹² 1911 Certified Sanborn Map, 900 Garfield, Jersey City, NJ, USNPR0009094.

¹³ *New York Times*, “Parts of Old Canal Sold by Railroad, Refiners Add 773 Feet to Holdings by Purchase of Jersey City Tract,” 4/23/1939, USNPR0009141.

¹⁴ New York Stock Exchange, Pittsburgh Plate Glass Company, 7/15/1954, PPGNPR0139837; and R. Bacon, “The War and American Industries,” *The Journal of Industrial and Engineering Chemistry*, 6/1916, 547-53 at 530, n. 1, USNPR0038730-36 at USNPR0038733.

¹⁵ Ronald L. Rice, The Morris Canal in Jersey City, http://www.canalsocietynj.org/Ron_Rice/morrisjc.html; Morris Canal Fact Sheet, Canal Society of New Jersey, <http://www.canalsocietynj.org/morrisfact1.pdf>.

¹⁶ Deposition of E. Warren Fairbanks, Exxon Corp v. PPG Industries, et. al. 3/7/1991, Docket No. C-001301-90, PPGNPR0074910-5036 at 5025-27.

III. World War I and Natural Products Refining Company

A. Introduction

In August 1914, a Serbian Nationalist assassinated the heir to the Austrian-Hungarian throne, Archduke Ferdinand. Within days, Germany sided with its ally, Austria. Russia mobilized its army and threw its support behind the cause of Serbian nationalism. France, in support of its Russian ally, mobilized, which led to a German attack on France through neutral Belgium. Great Britain then entered the war in support of France and Russia. Soon all of Europe was at war. In early August President Woodrow Wilson declared American neutrality in the developing war. Although many expected a short war, stalemates and trench warfare soon developed on the western and eastern fronts and war continued until November 1918. The United States officially remained neutral, although in reality many Americans sympathized with the allied powers. Economically, American trade with France, Britain, and Italy increased between 1914 and 1916, while American trade with Germany dwindled.¹⁷ Yet, the United States officially remained neutral until the spring of 1917 when Germany's resumption of undeclared submarine warfare led President Woodrow Wilson to ask Congress for a declaration of war on April 2, 1917.

B. United States Policy toward the War Before April 1917

In 1916, although officially neutral, the United States took steps to strengthen its national defenses and prepare the nation's economy to produce for war. On June 3, 1916, Congress passed the National Defense Act of 1916 that reorganized the Army and increased troop strength. That legislation expanded presidential power "in time of war or when war is imminent." The president could place "orders" for "purchase or production" with any firm capable of producing the equipment or product that the government wanted to buy. Compliance with such an order was obligatory.¹⁸ No documents have been found to indicate that any such order was issued to NPRC.

On August 29, 1916, Congress passed the Army's appropriation bill for fiscal year 1917. Section two of that act created the Council of National Defense (CND) "for the coordination of industries and resources for the national security and welfare" comprised of the Secretaries of

¹⁷ American trade with Britain and France increased 257% (to \$1.152 billion) and 393% (to \$628 million) between 1914 and 1916 where as American trade with Germany in 1916 was just .08% of the 1914 level (\$344.79 million). T. Bailey and D. Kennedy, *The American Pageant, A History of the Republic*, vol. II (Lexington, MA, 1979), 661.

¹⁸ 39 Stat. 166, 6/3/1916 at 213.

War, Navy, the Interior, Agriculture, Commerce, and Labor.”¹⁹ Bernard Baruch, who later became chairman of the War Industries Board (WIB), called the creation of the CND an “action of the greatest importance.”²⁰ Congress charged the CND with appointing a commission to investigate and make recommendations regarding the “increase of domestic production of articles and materials essential to the support of armies and of the people during the interruption of foreign commerce.”²¹ The advisory commission became known as the National Defense Advisory Council (NDAC). Baruch noted, “the council had no administrative power. It was only advisory.”²² Another contemporary writer noted “[b]eing advisory only, it had no administrative authority adequate to directly control.”²³

One historian has noted that NDAC “was both restricted and supple: restricted in that the council and commission could only investigate, advise and recommend; supple in that their purview was defined so broadly that they encompassed all possible aspects of industrial mobilization.”²⁴ NDAC included some of the most prominent men in the country: Howard Coffin, president of the Hudson Motor Car Company; Hollis Godfrey, president of Drexel University; the financier Bernard Baruch; physician Franklin Martin; Daniel Willard, the president of Baltimore and Ohio Railroad; Julius Rosenwald, President of Sears, Roebuck, and Company; and Samuel Gompers, the President of the American Federation of Labor.²⁵ Each individual took responsibility for advice on a specific area of the economy: transportation, engineering and education, munitions and manufacturing, medicine and surgery, raw materials, supplies, and labor.²⁶

During the winter of 1916-1917, numerous committees and bodies developed within NDAC that eventually developed into congressionally authorized administrative bodies including the Railroad Administration, the Fuel Administration, the Food Administration, the

¹⁹ 39 Stat. 619, 8/29/1916 at 649-50. Also see J. Lewis, *Summary of World War Experience in Industry*, circa, 1919, PPGNPR0009293-334 at PPGNPR0009294-95.

²⁰ B. Baruch, *American Industry in the War, A report of the War Industries Board* (Washington, DC: Government Printing Office, 1921), PPGNPR0013567-620 at PPGNPR0013576.

²¹ 39 Stat. 619, 8/29/1916 at 649-50.

²² Baruch, *American Industry in the War*, PPGNPR0013567-20 at PPGNPR0013577.

²³ J. Lewis, *Summary of World War Experience in Industry*, circa, 1919, PPGNPR0009293-33 at PPGNPR0009295.

²⁴ P. Koistinen, *Mobilizing for Modern War, The Political Economy of American Warfare, 1865-1919* (Lawrence, KS, 1997), pp. 158-59.

²⁵ Koistinen, *Mobilizing for Modern War*, pp. 148 and 154-59.

²⁶ Baruch, *American Industry in the War*, PPGNPR0013567-620 at PPGNPR0012577. On August 29, 1916, Congress also passed a naval appropriation bill for fiscal year 1917 that, among other things, called for increasing the number of naval vessels. Congress called on the President to authorize before July 1919 the construction of “[t]en first-class battleships,” “[s]ix battle cruisers,” “[t]en scout cruisers,” “[f]ifty torpedo destroyers,” “[n]ine fleet submarines,” and “[f]ifty-eight coast submariners.” The legislation further required the President to authorize a number of support ships (39 Stat. 556, 8/29/1916 at 616-17).

Shipping and War Trade Board, and the War Industries Board. In late February 1917, NDAC created the Munitions Standard Board (MSB) to work with the War and Navy Departments for “establishing standards for the manufacture of munitions of war.” The following month the General Munitions Board (GMB) took over the MSB. The GMB had broader authority and was charged with coordinating Army and Navy purchases of munitions and assisting the Army and Navy with “acquiring raw materials and manufacturing plants to meet their requirements.” The leadership and membership of the MSB migrated to the GMB, although the GMB also included members of the Army and Navy supply bureaus.²⁷

C. The United States Economy during Direct American Involvement in World War I

1. The War Industries Board (WIB)

Even before direct United States involvement in the war, purchases of military goods soon led to shortages. In April 1917, when President Wilson asked and received from Congress a declaration of war, shortages of military goods increased. Baruch observed that in the spring and early summer of 1917 government purchasing was “accompanied by confusion and overlapping of duties and jurisdictions.”²⁸ On July 28, 1917, in an attempt to bring order to the chaotic situation and with approval of the president, NDAC created the War Industries Board (WIB). The WIB took over the responsibilities of the MSB and GMB, both of which were then abolished. Frank Scott, who had chaired the MSB and GMB, became the first chairman of the WIB. Baruch became commissioner of raw materials. The responsibilities of the WIB were,

[t]he Board will act as a clearing house for the war industries needs of the Government, determine the most effective ways of meeting them and the best means and methods of increasing production, including the creation or extension of industries demanded by the emergency, the sequence and relative urgency of the needs of the different Government services, and consider price factors, and in the first instance the industrial and labor aspects of the problems involved and the general questions affecting the purchase of commodities.²⁹

Despite the responsibilities given to WIB, it lacked authority. The WIB remained under the NDAC who only had advisory authority. Baruch later noted that in order to achieve its goals the WIB relied on the president, the military, and other agencies and on “the voluntary support of business men of the country.” Usually, “cooperation and cordial goodwill” prevailed, although

²⁷ Baruch, *American Industry in the War*, PPGNPR0013567-620 at PPGNPR0013577.

²⁸ Baruch, *American Industry in the War*, PPGNPR0013567-620 at PPGNPR0013578.

²⁹ Baruch, *American Industry in the War*, PPGNPR0013567-620 at PPGNPR0013578. Also see USNPR0000751.

government officials sometimes questioned the necessity of following the direction of a board that only had advisory authority.³⁰ Yet, the American economy continued to under produce in the winter of 1917-1918 as the demand for war materiel increased. One historian characterized the economy as “grinding to a halt” in the winter of 1917-1918. To correct the situation, the president reorganized the WIB and directed the War Department to centralize control of the supply bureaus.³¹ On March 4, 1918, the president, in a letter to Baruch, ordered the reorganization of the WIB. The president tasked the reconstituted WIB with six responsibilities:

- (1) The creation of new facilities and the disclosing, if necessary, opening up of new or additional sources of supply;
- (2) The conversion of resources and facilities where necessary, to new uses;
- (3) The studios conversion of resources and facilities by scientific, commercial, and industrial economies;
- (4) Advise to the several purchasing agencies of the Government with regard to the prices to be paid;
- (5) The determination, wherever necessary, of the priorities of production and of delivery and of the proportions of any given article to be made immediately accessible to the several purchasing agencies when the supply of that article is insufficient, either temporarily or permanently;
- (6) The making of purchases for the Allies.³²

On May 28, 1918, by executive order, the president made the WIB an administrative agency of the executive branch.³³ Although now under direct White House control, Baruch later wrote that the WIB’s success largely rested on other government agencies and the “voluntary support of business interests of the country.” Congress debated additional legislation expanding the WIB’s authority, but never passed any such legislation.³⁴

³⁰ Baruch, *American Industry in the War*, PPGNPR0013567-620 at PPGNPR0013579.

³¹ Koistinen, *Mobilizing for Modern War*, pp. 106-07.

³² Baruch, *American Industry in the War*, PPGNPR0013567-620 at PPGNPR0013579.

³³ The Overman Act authorized the president to reorganize the executive branch for “the successful prosecution of the war,” 40 Stat. 556, 5/20/1918.

³⁴ Baruch, *American Industry in the War*, PPGNPR0013567-620 at PPGNPR0013580.

2. World War I Priority System

Perhaps the most important function of the WIB during World War I was the establishment of a priority system for the allocation of scarce resources and the manufacture of those resources into finished products. A major goal of the WIB was to ensure that business and industry engaged in war production received the necessary raw materials and semi-finished products necessary for production of war materiel. Early attempts at creating a priority system originated in the GMB in May 1917. By the summer of 1917, the GMB was fielding requests from business and industry as to which orders they should fill first. However, the GMB lacked authority to make such determinations. More tangible work in creating a priority system began after the creation of the WIB on August 23, 1917, when Robert Lovett became priorities commissioner. On September 21, 1917, the WIB issued Priorities Circular Number 1 that fixed the price of copper. It was not until the following spring, after the president reorganized the WIB and placed it under executive branch control, that the WIB gained legal authority. President Wilson extended to the WIB the legal authority he had received under the Defense Act of 1916 to give priority to government purchases.³⁵

The priority system used a combination of letters and numbers to determine which orders received preference. Five general classes were assigned a letter from A to F and within each class a number was assigned such as A-1, A-2, A-3. An A order took precedent over a B order and a B order took precedent over a C order. The WIB never issued class D or F orders. An order receiving the special designation of AA, considered emergency war work, took priority over all other orders. Class A work was all other war work whereas Class B was work that was not of a defense nature, but considered necessary to the public interest. All other orders received a Class C rating. An individual or business engaged in production would file a form with the Priorities Division, which then determined which rating the item to be manufactured received. Between September 25, 1917, and Armistice Day on November 11, 1918, the Priorities Division received 211,430 applications and issued 191,966 priority certificates.³⁶

3. WIB Conservation Division and Advisory Committees

Closely related to the activities of the WIB's Priorities Division was the Conservation Division's work. Whereas the Priority Division acted to guarantee that manufacturing for the war took precedent over manufacturing not required for the war, the Conservation Division strove to make sure that war manufacturing received first use of scarce resources. To complete its work, the Conservation Division studied businesses and industries experiencing shortages to

³⁵ Baruch, *American Industry in the War*, PPGNPR0013567-620 at PPGNPR0013591-93. Baruch discusses several other laws that gave the executive branch wartime authority. See *Ibid*.

³⁶ Baruch, *American Industry in the War*, PPGNPR0013567-620 at PPGNPR0013594-95.

determine how to reduce waste. This often occurred by eliminating a particular practice. For example, deliveries to retail stores in major cities were limited to one per day. In the shoe industry, a schedule was written limiting color choices to black, white, or tan. Yet, another example occurred in the agricultural sector in which the types of steel plows dropped from 312 to 76.³⁷ These sorts of efforts conserved resources and made them available for war production.

A circa November 1918 WIB memorandum regarding “Measures Adopted for the Conservation of Chromite” stated as to chrome chemicals that as of that time “no definite agreements were drawn up for the conservation of chromite in the chemical industries. The Conservation Section of the War Industries Board simply requested the Trade to do all in their power to reduce the consumption of products manufactured from chromite and the Trade agreed to exert its efforts toward this end.” This apparently included manufacturers of dry colors, shoe manufacturers, and the textile trade.³⁸

Numerous advisory committees existed that provided expertise to the NDAC and then the WIB. Concurrent with the formation of the WIB was the establishment of war service committees. The Council of National Defense worked with the United States Chamber of Commerce to create the war service committees comprised of leading business executives. Private money financed these non-governmental committees. There was thus a two-tiered system of committees: the publicly oriented NDAC/WIB advisory committees and the privately organized war service committees. Gradually, WIB started to phase out the advisory committees and replaced them with commodity sections. A chief and several assistants, usually from the private sector, led each commodity section. Members of claimant agencies such as the Army or Navy were represented in the commodity sections. By the end of the war, the WIB created fifty-seven commodity sections while the U. S. Chamber of Commerce certified around 300 war service committees.³⁹ This public-private partnership became responsible for mobilizing the American economy for war. The president of the United States’ Chamber of Commerce offered this description of the commodity section-war service relationship,

[t]hrough the commodity sections on the side of Government and the war service committees on the side of business, all industry was merged in the War Industries Board. Subject to the veto of the Chairman of the Board, as the supreme interpreter of the national good, industry imposed its own emergency laws and regulations and assumed nine tenths of the burden and responsibility of enforcing them.⁴⁰

³⁷ Baruch, *American Industry in the War*, PPGNPR0013567-620 at PPGNPR001299-301.

³⁸ Memorandum for Mr. Spear, *Measures Adopted for The Conservation of Chromite*, 11/26/1918, PPGNPR0013734-63 at PPGNPR0013734-35.

³⁹ Koistinen, *Mobilizing for Modern War*, pp. 209-11. Also see, no author, Subject, Industry Committees in World War I, 12/11/1941, USNPR0000946-52.

⁴⁰ Koistinen, *Mobilizing for Modern War*, p. 212.

Historian Paul Koistinen noted that industry controlled the flow of information that the WIB needed for economic mobilization and concluded “[d]ominance through personnel and information meant that industry shaped essential wartime controls such as clearance, priority, and pricing.”⁴¹

Accordingly, “[c]onservation as a means of fulfilling the deficits” in war materials “was not employed in the United States . . . by the war industries, except in cases of definite shortage. The real results that were brought about were through the conservation of basic commodities by the civil population.” “After a conservation course of action had been determined” by the WIB, “the usual method was to call in the representatives of the businesses and industries affected and, through their cooperation, put the plan into effect.”⁴²

Pursuant to a July 1917 presidential proclamation, the export of “important commodities, mainly fuel, oils, foodstuffs, iron and steel, fertilizer, arms, ammunition and explosives were prohibited, except under license.” An August 1917 presidential proclamation prohibited virtually all exports to enemies or to neutral European nations, except under license. In August 1917, the powers of the Council of National Defense relating to exports were transferred to the Export Administrative Board by executive order. After the October 1917 passage of the Trading with the Enemy Act, the Export Administrative Board was replaced by the additional administrative machinery of the War Trade Board by executive order. This Board had the authority to issue, withhold, or refuse licenses for the exportation of almost all articles, licenses for the importation of all articles, and licenses to trade directly or indirectly with the enemy or Allies of the enemy.⁴³

4. Chemicals and Chromite

Chemicals have traditionally been of major importance during war, with explosives being the most obvious of their use. In April 1917, the NDAC created a chemicals committee. In the winter of 1917-1918, the Chemicals and Explosive Section was formed. Finally, in the spring of 1918, the WIB created a Chemicals Division. Chromite was under the jurisdiction of the Ferroalloys Section, which fell under the Chemical Division.⁴⁴

⁴¹ Koistinen, *Mobilizing for Modern War*, p. 213.

⁴² J. Lewis, *Summary of World War Experience in Industry*, circa, 1919, PPGNPR0009293-334 at PPGNPR0009312.

⁴³ J. Lewis, *Summary of World War Experience in Industry*, circa, 1919, PPGNPR0009293-334 at PPGNPR0009302-03.

⁴⁴ Baruch, *American Industry in the War*, PPGNPR0013567-620. Another document, the *Official Bulletin*, “Chemicals and Explosives Divisions Created by the War Industries Board,” has a handwritten date of “July 10/18” on the bottom of the document, PPGNPR0014951.

Also within the WIB, the Paint and Pigment Section worked to reduce the demand for raw materials including chrome ore on a voluntary basis. “The program, developed both for finished products and raw materials, was primarily a conservation program based on (a) asking manufacturers to urge their customers to use less of those paints composed of raw materials needed for the war effort and (b) appealing to consumers to use paint only for essential purposes.”⁴⁵ That scarcity included the shortage of chrome ore,

During 1917 and 1918 the Government became interested in chrome pigments because they required many raw materials essential to the war effort. Chrome ore, for example, was largely imported, and with the scarce shipping tonnage it was doubtful that enough chrome could be obtained to fill the Army's requirements for chrome steel, chrome tanned leather and chrome dyed textiles. Consequently the use of chrome ore for pigments had to be reduced. . . . A corollary of the reduction in the use of raw materials for colors was the conservation program for chrome pigments. Government control over these pigments during 1918 was limited to a conservation program since the Government's interest was in the raw material and not in the manufactured color.⁴⁶

Although government officials drafted conservation measures for chrome chemicals, the war ended before they were implemented.⁴⁷ Scarcity of products and goods contributed to inflation during World War I and, although inflation was high during World War I, the government never instituted price controls for paints and their raw materials.⁴⁸

5. Labor during World War I

As noted, Samuel Gompers of the American Federation of Labor was a member of the NDAC. Labor did not play a strong role in formulating wartime policy, but labor itself was essential to the production of war materiel needed to outfit the American military and the allies. The outbreak of World War I followed a period in American history when labor was strong. A 1912 law mandated an eight-hour workday for federal contractors.⁴⁹ Radicalism reached a high

⁴⁵ J. Edwards, *Paint and Varnish, Conservation of Finished Product and Control of Raw Materials, 1917-1918* PPGNPR0812905-20 at PPGNPR0812908-09.

⁴⁶ Edwards, *Paint and Varnish, Conservation of Finished Product and Control of Raw Materials, 1917-1918* PPGNPR0812905-20 at PPGNPR0812912.

⁴⁷ Edwards, *Paint and Varnish, Conservation of Finished Product and Control of Raw Materials, 1917-1918* PPGNPR0812905-20 at PPGNPR0812910-11.

⁴⁸ Edwards, *Paint and Varnish, Conservation of Finished Product and Control of Raw Materials, 1917-1918* PPGNPR0812905-20 at PPGNPR0812909, PPGNPR0812914-16.

⁴⁹ Koistinen, *Mobilizing for Modern War*, pp. 259-61.

point in the 1912 presidential election when Eugene Debbs won more than a million votes running as a socialist.

In April 1918, President Wilson created the National War Labor Board (NWLB) that consisted of five representatives from labor and five representatives from management. Former President William Howard Taft co-chaired the NWLB with Frank Walsh, former chair of the U.S. Commission on Industrial Relations. Although labor relations committees existed in other wartime agencies and within the Army and Navy (who soon became involved in labor issues as purchasers of military equipment), the NWLB was “a court of last resort” when other agencies failed to resolve labor-management disputes. The NWLB—which adopted a no strike and no lock out policy—recognized the legitimacy of union membership and collective bargaining, the right of non-union shops to exist, equal pay for women, and the eight-hour workday.⁵⁰ After the war, Baruch wrote that the NWLB sought “to settle labor disputes through informal mediation.” Failing that, the board sat as a whole to try to reach a unanimous decision. The last option was the selection of an “umpire” by a ten-person panel who had the final authority to resolve the dispute.⁵¹

In an attempt to standardize and coordinate labor policies across government agencies, President Wilson created the War Labor Policies Board (WLPB) soon after he established the NWLB. Representatives of the various war agencies served on the WLPB and they attempted to address issues of “distribution of labor, wages, hours, and working conditions.” Among the WLPB’s primary goals was to standardize wages on a regional basis to prevent workers from moving from industry to industry in search of better paying jobs. The WLPB made little progress before the war ended in November 1918.⁵²

6. Food, Fuel, and Shipping

At war since August 1914, much of Europe faced food shortages as many of the continent’s farmlands became battlefields. At the same time, the growing wartime economy taxed American fuel resources and railroad capacity at a time when the country’s agricultural output increased to feed the Allies and then the American Army. Rising prices and demand for food and fuel coupled with scarcity overwhelmed the NDAC and led Congress to pass on August 10, 1917, the “Food and Fuel Act” with the purpose of “encouraging the production, conserving the supply, and controlling distribution of food products and fuel.”⁵³ Future President Herbert

⁵⁰ Koistinen, *Mobilizing for Modern War*, pp. 259-61. Also see, National War Labor Board, Proclamation of the President of the United States Creating the National War Labor Board, 1918, USNPR0000752-57.

⁵¹ Baruch, *American Industry in the War*, PPGNPR0013567-620.

⁵² Koistinen, *Mobilizing for Modern War*, pp. 259-61; and Baruch, *American Industry in the War*, pp. 91-92, PPGNPR0013567-620.

⁵³ Koistinen, *Mobilizing for Modern War*, pp. 254-55; and 40 Stat. 276, 8/10/1917.

Hoover, who had become a well-known mining engineer, ran the Food Administration. President Wilson selected James A. Garfield, son of the slain president, to head the Fuel Administration. Hoover opted for “moral suasion and powerful persuasion” instead of food rationing. All military purchases of food for American troops and the Allies went through the Food Administration that gave Hoover power in setting prices. Hoover denied that he exercised his power to bring the food situation under control and pointed to the cooperative spirit of the many involved on the local, state, and federal level. Garfield operated similar to Hoover in addressing the fuel situation. Garfield worked through the privately operated war services committees to bring a sense of order to the fuel situation.⁵⁴

Control over exports such as food, fuel, and war materiel; and imports including raw materials such as chromite, grew in importance during World War I. As noted, even before the United States Declaration of War the nation’s exports to the British and French had substantially increased. In June 1917, President Wilson created the Exports Council comprised of the secretaries of State, Agriculture, and Commerce and the Food Administrator. The Export Council was to recommend and to advise the president on granting export licenses.⁵⁵ In August 1917, President Wilson, by executive order, created the Exports Administration Board, which also was short-lived. On October 6, 1917, Wilson issued Executive Order 2729A that authorized the creation of the War Trade Board (WTB), which replaced the Exports Administration Board. The WTB directed most American imports and exports and worked with foreign governments to control world trade when possible.⁵⁶ The WTB controlled American imports and exports and worked with the country’s allies to exert control over as much international trade as possible. As did many World War II boards, the WTB relied on private industry for its operations.⁵⁷

In early 1918, a scarcity of ships led to a restriction on imports of chromite.⁵⁸ To counter the loss of imports, domestic production increased, albeit slowly. Between January and June, domestic production amounted to 20,250 tons. However, from June through September, domestic producers shipped 28,220 tons. The majority of the domestic production came from California and Oregon.⁵⁹ The domestic production of chromite exceeded the expectations of the

⁵⁴ Koistinen, *Mobilizing for Modern War*, 255-56.

⁵⁵ Woodrow Wilson, “Executive Order 2645 – Export Licenses Exports Council,” 6/22/1917. Online by Gerhard Peters and John T. Woolley, *The American Presidency Project*, <http://www.presidency.uscb.edu/ws/?pid=75426>.

⁵⁶ Woodrow Wilson, “Executive Order 2729A – Vesting Power and Authority in Designated Officers and Making Rules and Regulations Under Trading with the Enemy Act and Title VII of the Act Approved June 15, 1917,” 10/12/1917. Gerhard Peters and John T. Woolley, *The American Presidency Project*, <http://www.presidency.uscb.edu/ws/?pid=75446>.

⁵⁷ Koistinen, *Mobilizing for Modern War*, 256-57.

⁵⁸ For a discussion of the chrome and manganese shortage see P. Pierce, Memorandum for E. Stettinius, 5/3/1918, USNPR0003964-65.

⁵⁹ War Industries Board, Division of Planning and Statistics, *Commodity Bulletin, Monthly Report on Minerals*, 11/1918, USNPR0001131-36. For more on chromite imports and domestic production between 1910 and 1937 see,

Bureau of the Mines. On November 11, 1918—the day the European armistice took effect—War Trade Bulletin 314 limited chromite imports to those originating in Cuba, Canada, or Brazil.⁶⁰

7. Alleged Ore and Chemical Price Controls

No evidence has been found that during World War I any agency of the United States controlled the profits made by NPREC through orders regarding maximum prices for its chemical products, or regarding the prices paid by the company for chromite or other raw materials.⁶¹ To the contrary, a June 1916 article in Volume 8, Number 6 of the *Journal of Industrial and Engineering Chemistry*, “The War and American Chemical Industry” stated that during 1915, the production of potassium dichromate had been limited because manufacturers, such as NPREC, had been unable to obtain adequate quantities of potassium chloride from Germany. Sodium dichromate was being substituted and “[c]ontracts for sodium dichromate are now being made on a basis of 20 to 22 cents, as against 4 1/2 to 4 3/4 cents for 1915.”⁶² In other words, in a single year, the price of sodium dichromate increased some 500 percent, an unlikely event had price controls existed. A WIB study published in November 1918 discussed and compared prices between the Civil War and World War II of ninety-two commodities including “bichromate of potash.” The price in each July from 1914 through 1918 was \$1.46, \$1.86, \$1.93, and \$1.86 respectively.⁶³

The available literature indicates that as of late 1917, there were still no such price controls. In fact, no price controls existed during World War I to safeguard the interests of the Government, industry, and the civilian population from inflation and war profiteering prior to the passage of the Food and Fuel Act in August 1917. Under the Food and Fuel Act prices for food were regulated through the issuance of licenses that allowed for a “reasonable margin” above the cost of the food.⁶⁴

G. Roush, “General Information on Chromium, Extracted from ‘Strategic Mineral Supplies,’” Table 2, “Available Supply of Chromite in the United States,” USNPR0003927-48 at USNPR0003940. As this table shows, except for the period during 1916-1918 domestic production of chromite was minimal.

⁶⁰ War Industries Board, Division of Planning and Statistics, *Commodity Bulletin*, Monthly Report on Minerals, 12/1918, USNPR0001137-41.

⁶¹ For a discussion of the WIB’s role in wartime planning see, *The Iron Age*, 9/1917, PPGNPR0014957-89

⁶² R. Bacon, “The War and American Industries,” *The Journal of Industrial and Engineering Chemistry*, 6/1916, 547-53 at 530, n. 1, USNPR0038730-33 at USNPR0038733.

⁶³ WIB, Division of Planning and Statistics, Price Section, *A Comparison of Prices During the Civil War and Present War*, PPGNRP0014732-4 at PPGNPR0014733 and PPGNPR014747.

⁶⁴ see J. Lewis, *Summary of World War Experience in Industry*, circa, 1919, PPGNPR0009293-334 at PPGNPR0009313-14

D. NPRC during WWI

The available documents do not reveal any actions or decisions by any federal agency specifically governing any manufacturing operations or waste handling activities at the NPRC plant during World War I. Further, no evidence has been found indicating that any federal personnel themselves conducted or directed any activities at the plant itself during that period, that any were stationed or had office space there, or visited the plant for any purpose during the war.

The NPRC continued operations during the war. The French government blockaded the shipment of chromite ore from New Caledonia, except for exportation to France and its allies. In November, the Secretary of State told the American Ambassador in France that the NPRC needed 2,000 tons of ore, “so small cannot affect supply for Army Navy purposes.”⁶⁵

The 1918 Industrial Directory of New Jersey identified NPRC as a manufacturer of bichromate of soda and of potash, with about 90 employees.⁶⁶

Henry Goman, and the NPRC, evidently did well financially during World War I. In 1921 Goman purchased the 150-foot, 185-ton, yacht *Kelich*. During World War II, the Navy used the yacht—which Goman sold in 1927—for training purposes.⁶⁷

E. Conclusions Relating to NPRC during World War I

Federal actions, laws and regulations relating to the import or export of chromium chemicals from the United States during World War I had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

Federal actions, laws and regulations relating to the allocation of cargo space aboard oceangoing ships during World War I for the importation of various raw materials into the United States, including chromite, had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

Federal actions, laws and regulations relating to any Government stockpiling of chromite

⁶⁵ Acting Secretary of State to Ambassador in France, 10/31/1944, PPGNPR0961167; and the Secretary of State to the Ambassador in France, 11/25/1914, PPGNPR0961168.

⁶⁶ Lewis T. Bryant, *The Industrial Directory of New Jersey* (Trenton, New Jersey, 1918), USNPR0001770-71.

⁶⁷ G. Williams, *World War II U.S. Navy Vessels in Private Hands: Boats and Ships Sold and Registered for Commercial and Recreational Purposes Under the American Flag*, (Jefferson, NC: McFarland, 2013), 188-89.

in places such as Baltimore and Philadelphia during World War I had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

Any federal actions, laws and regulations relating to who was allowed to purchase chemicals during World War I had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

Any federal actions, laws and regulations relating to what quantities of chemicals a purchaser could buy during World War I had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

Any federal actions, laws and regulations relating to the prices the Government charged chromium chemical manufacturers for ore that the Government sold to them during World War I had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

Any federal actions, laws and regulations relating to the prices the chromium chemical manufacturers could charge their customers during World War I had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

Any federal actions, laws and regulations relating to the permitted uses of chemicals by the purchasers of them during World War I had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

Any federal actions, laws and regulations relating to the conservation of scarce materials during wartime through restrictions on permitted uses of those materials during World War I had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

Any federal actions, laws and regulations relating to the allocation of scarce materials among competing users of those materials during World War I had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

Any federal actions, laws and regulations relating to the priority designations that

governed the order in which wartime contracts for goods would be performed during World War I had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

Any federal actions, laws and regulations relating to the Government's designation of chromium ore or chemicals as either "strategic" or "critical" during World War I had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

Any federal actions, laws and regulations relating to federal efforts during World War I to balance the supply of manufacturing workers with the requirements for such workers in various industrial plants had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

Any federal actions, laws and regulations relating to hiring workers for chemical and other industrial plants had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

No documents found indicate that during World War I any agency of the United States took or proposed any action with respect to NPREC by name, or issued, gave, or made any request, notice, order, direction, decision, or ruling to NPREC by name.

No documents found indicate that during World War I anyone employed by an agency of the United States ever issued or gave orders, instructions, or directions to NPREC directors, officers, managers, executives, supervisors, or hourly workers concerning how, when, or where to perform steps in the chromite processing or chromium chemical manufacturing processes at the Garfield Avenue plant.

No documents found indicate that during World War I anyone employed by an agency of the United States ever issued or gave any orders or instructions to NPREC workers regarding how, when, or where to handle, manage, or dispose of residues, sludges, or wastes generated during chromite processing or chromium chemical manufacturing processes at the NPREC plant.

No documents found indicate that during World War I any agency of the United States ever purchased, or held title to or an ownership interest in, any residues, sludges, or wastes generated during chromite processing or chromium chemical manufacturing operations at the plant.

No documents reviewed indicate that any agency of the United States ever owned any of

the buildings, machinery, equipment, other facilities, or land at or near the Garfield Avenue plant during World War I.

No documents reviewed indicate that any employee or representative of any agency of the United States resided at, visited, inspected, or performed duties or responsibilities at the Garfield Avenue plant during World War I.

No documents found indicate that during World War I any federal agency, including the War Industries Board, stated or advised NPRC that its failure to agree to the price for products set by an agency of the United States during World War I would result in a takeover of the NPRC plant for the duration of the war.

The Government never seized or threatened the seizure or take-over of the Plant during World War I for any reason.

IV. 1919 through the “Defense Period” (November 1941)⁶⁸

A. Chromite Use and NPRC

1. Increased Chromite Use

Following World War I, uses of chromite for metallurgical, refractories, and chemicals continued to expand. In 1929, world chromite production was twice the wartime high. Eight years later, world production was twice the 1929 level. In the United States, the amount of available chromite also increased, but the domestic supply did not mirror the increase in world production. In 1918, the supply in the United States was 182.5 long tons. By 1929, the available supply was nearly 320 long tons. During the Great Depression supply declined, although by 1936, there were 325 long tons available. The following year the supply increased to 556.9 long tons. At no time between 1920 and 1937 did domestic American production exceed .05 percent of the total supply. The increased production and supply of chromite resulted from the increase of chromium for refractory purposes. Chromite for chemicals dipped in the 1920s from a high in 1918, although it showed an increase between 1927 and 1937. Table One shows the shift in chromite use in the three major industries.

During these decades, almost all supplies of all three types of chromite consumed in the United States were imported by oceangoing vessels. This continued throughout World War II.

⁶⁸ The “Defense Period” was from the spring of 1940 when the United States first took steps to mobilize its economy to aid France and Great Britain to when the Japanese bombed Pearl Harbor.

Table One

Percentage Distribution of Chromite by Industries⁶⁹

Industry	1918	1922	1925	1927	1937
Metallurgical	52	40	32	46	45
Refractory	17	35	41	41	40
Chemical	31	25	27	13	25

During the interwar period, military products made with the chemicals produced from chemical grade chromite mirrored non-military uses, for leather tanning and use as a dye remained the primary military uses.⁷⁰

In April 1934, the War Department recognized that chromite ore was among numerous “strategic raw materials” for which an inadequate supply existed were “a major emergency” to occur. The War Department estimated that a stockpile of 350,000 short tons of chromite would be needed prior to an emergency to ensure enough for Army, Navy, and civilian production for a two-year period. In May 1934, the Army and Navy Munitions Board (ANMB) estimated 300,000 short tons of chromite ore would be needed during an emergency and recommended the establishment of a “War Reserve” of “strategic raw materials.”⁷¹

2. Natural Products in the 1920s and 1930s

Available financial information indicates that Natural Products’ sales generally increased in the 1930s. As shown in Table Two, sales in 1933 were not much greater than ten years previous, although sales did increase from 1933 through 1939, except during the recession year of 1938.

⁶⁹ G. Roush, “General Information on Chromium, Extracted from ‘Strategic Mineral Supplies,’” USNPR0003927-48 at USNPR0003927-29, USNPR0003940, and USNPR0003948.

⁷⁰ Roush, “General Information on Chromium,” USNPR0003927-48 at USNPR0003934.

⁷¹ War Department, Strategic Materials, 4/3/1934, USNPR0003918-19; and Army Navy Munitions Board to The Joint Board, 5/5/1934, USNPR0003921-22.

Table Two
NPRC Sales Figures: Select Years 1923-1940

Year	Sales	Source	Bates No.
1923	\$721,738*	Dept. of Stock List, NY Stock Exchange, 1954	PPGNPR0089439
1933	\$749,425*	Dept. of Stock List, NY Stock Exchange, 1954	PPGNPR0089439
1936	\$1,233,890**	Financial Data For Selected Manufactures of Chromium Tanning Materials, 1936-40	USNPR0000294
1937	\$1,543,144**	Financial Data For Selected Manufactures of Chromium Tanning Materials, 1936-40	USNPR0000294
1938	\$1,172,233**	Financial Data For Selected Manufactures of Chromium Tanning Materials, 1936-40	USNPR0000294
1939	\$1,671,145**	Financial Data For Selected Manufactures of Chromium Tanning Materials, 1936-40	USNPR0000294
1940	\$1,837,540**	Financial Data For Selected Manufactures of Chromium Tanning Materials, 1936-40	USNPR0000294

* Listed as "Sales." ** Listed as "Net Sales."

Natural Products' employment in 1940 was slightly lower than in 1931, although the company employed 150 in 1934. As will be discussed later in this report, labor shortages plagued Natural Products and other companies engaged in chrome chemical production throughout World War II.

Table Three
NPRC Employment Figures

Year	No. Employees	Source	Bates No.
1931	127	1931 Industrial Directory of New Jersey	USNPR0001772-74
1934	150	1935 Industrial Directory of New Jersey	USNPR0001775-77
1940	120	1940-41 Industrial Directory of New Jersey	USNPR0001778-80

No general historical or company business documents have been found that indicate that any agency of the federal government had any responsibility for managing or directing industrial hygiene and laborers' working conditions at the Garfield Avenue plant during this time period. In *Domscheit v. Natural Products Refining Co.*, 185 A. 483 (N.J. Dept. Labor-Workmen's Comp. Bureau 1936), a cooper handling barrels of sodium bichromate was found to have suffered destruction of the nasal septum and damage to his throat as a result of exposure to the chemical's dust and fumes from 1930 to 1933. The decision made no reference to any federal personnel.⁷²

In general, no documents that I have found indicate that during the 1920s or 1930s

⁷² *Domscheit v. Natural Products Refining Co.*, 1936.

anyone employed by an agency of the United States ever issued or gave orders, instructions, or directions to NPRC directors, officers, managers, executives, supervisors, or hourly workers concerning how, when, or where to perform steps in the chromite processing or chromium chemical manufacturing processes at the Garfield Avenue plant. Likewise, no documents reviewed indicate that during these decades anyone employed by an agency of the United States ever issued or gave any orders or instructions to NPRC workers regarding how, when, or where to handle, manage, or dispose of residues, sludges, or wastes generated during chromite processing or chromium chemical manufacturing processes at the NPRC plant. Finally, no documents found indicate that during this period any agency of the United States ever purchased, or held title to or an ownership interest in, any residues, sludges, or wastes generated during chromite processing or chromium chemical manufacturing operations at the plant.

B. Pre-World War II Planning Agencies and Actions

1. The Army-Navy Munitions Board (ANMB)

The 1920 Defense Act designated the Assistant Secretary of War responsible for procurement of supplies, “mobilization of materiel and industrial organizations essential for war-time needs.”⁷³ In 1922, under the leadership of the Assistant Secretary of War, the War Department created the Army-Navy Munitions Board. The Under Secretaries of War and Navy, along with their staff, served on the ANMB. The ANMB’s goal was to coordinate planning, procurement, and economic readiness. However, little cooperation occurred in the 1920s and the ANMB floundered. Although reorganized in 1931, the ANMB accomplished little while the Under Secretary of War shouldered most of the responsibility for preparedness during the 1930s.⁷⁴ Yet, the American military was of little consequence during the Great Depression, as the Roosevelt administration focused its attention on the domestic crisis until later in the decade.

President Franklin Roosevelt breathed new life into the ANMB in 1939 when he placed it under direct White House supervision. When the American military and economy started to expand in 1940 and 1941, the ANMB took on new responsibilities including the formation of the first priority system. In June 1940, the Assistant Secretaries for the Army and Navy had created the Army Navy Munitions Board (ANMB) Priorities Committee.⁷⁵ After establishment of the War Production Board in January 1942, the ANMB largely became irrelevant.⁷⁶

⁷³ 41 Stat. 759, 6/20/1920 at 764-65.

⁷⁴ P. Koistinen, *Planning War, Pursuing Peace, The Political Economy of American Warfare, 1920-1939* (Lawrence, KS, 1998), pp. 10-12.

⁷⁵ R. Smith, *United States Army in World War II, The War Department, The Army and Economic Mobilization* (Washington, D.C.: Government Printing Office, 1959), pp. 508-09.

⁷⁶ Koistinen, *Planning War, Pursuing Peace*, pp. 11-12.

2. 1939 Industrial Mobilization Plan and Neutrality Laws

During the 1920s and 1930s, the War Department oversaw the preparation of numerous war mobilization plans that drew on the planning experience of the WIB. The War Department prepared the first rudimentary plan in 1922. Others followed in the 1920s and then the War Department authored four “Industrial Mobilization Plans” in the 1930s, each more sophisticated than the last. The final plan appeared in 1939.⁷⁷ The goal of the 1939 plan was “to avoid the repetition of the industrial mistakes of 1914-1918.”⁷⁸

The 1939 Industrial Mobilization Plan (IMP) represented a clean break from earlier versions. Although the Office of the Undersecretary of War started writing the 1939 IMP in early 1938, by the time the plan was completed, German expansion was well underway as Hitler took control of Central and most of Eastern Europe. Paul Koistinen notes that the 1939 IMP had “three fundamental changes.” One, the 1939 plan proposed creation of a War Resources Agency (WRA) that would oversee all mobilization. “[P]atriotic business leaders of the nation,” representatives of other wartime agencies, members from WRA divisions, and the Secretaries of the Army, Navy, and War would comprise the WRA membership. Two, the 1939 IMP sought to utilize the expertise of existing government organizations such as the Treasury Department or the Securities and Exchange Commission. In general, this did not occur during World War II when President Roosevelt created many new and temporary agencies. The third change in the 1939 IMP was the elimination of appendices or “annexes” that detailed how economic mobilization would occur. Although the 1939 IMP represented a departure from past mobilization plans it nonetheless was somewhat ineffective.⁷⁹ Despite its ineffectiveness, the United States through the 1939 IMP and the ANMB made strides toward preparedness not seen before World War I.

The desire to at least plan for mobilization in the 1930s was at cross currents with two other interrelated political issues of the decade: isolationism and neutrality. During the decade, Congress passed several neutrality laws that dictated what exactly the United States could do in times of war. Congress passed the first Neutrality Act in 1935 and then passed three more acts in 1936, 1937, and 1939. Each act became more comprehensive, and most considered the 1937 Act a permanent piece of legislation. The neutrality acts made no distinction between an aggressor nation and a nation under attack—all were considered belligerent nations. The basic terms of the neutrality acts were an arms embargo, a ban on loans to belligerent nations, a ban on American citizens traveling on ships of belligerent nations except at their own risk, and a stipulation that

⁷⁷ Koistinen, *Planning War, Pursuing Peace*, pp. 2-3 and 50-71.

⁷⁸ 1939 Industrial Plan, PPGNPR0009226-51 at PPGNPR0009232.

⁷⁹ Koistinen, *Planning War, Pursuing Peace*, pp. 66-71.

trade of non-embargoed goods had to be on a cash and carry basis. The 1939 Neutrality Law, however, removed the arms embargo.⁸⁰

3. President Roosevelt, Critical Materials, Limited National Emergency, and First Steps Toward Economic Mobilization

Although President Roosevelt signed the neutrality laws, he supported the British and French as Germany rearmed and expanded into Central and Eastern Europe in the late 1930s. In October 1937, he delivered his “Quarantine Speech” in response to the Sino-Japanese War. The following fall, after Germany’s annexation of Austria and the Munich Agreement—in which Czechoslovakia ceded the Sudetenland to Germany, Roosevelt asked for an additional 10,000 planes for the Army Air Corps and the production capacity to build another 10,000 per year.⁸¹

Although the 1937 Neutrality Law dictated American foreign policy and many in Congress remained ardently isolationist, Congress did pass the Strategic Metals Act on June 7, 1939, that addressed strategic and critical materials. The legislation instructed the secretaries of War, Navy, and Interior to work with the ANMB to identify “strategic and critical materials essential to the needs of industry for the manufacture of supplies for the armed forces and civilian population in times of a national emergency.”⁸² Provisions of the law called for exploration, development, and storage of strategic and critical materials and authorized Congress to allocate \$100 million for the period from June 30, 1939 to June 30, 1943. In fact, Congress immediately authorized \$10 million, another \$12.5 million in March 1940, and then in the critical month of June 1940 \$47.5 million more.⁸³

In the summer of 1939, the international situation continued to deteriorate. On August 23, 1939, the Soviet Union and Germany signed the non-aggression pact in which they agreed to respect the other countries’ borders. On September 1, Germany invaded Poland from the west and the Soviets did the same from the east in mid-September. The French and British then declared war on Germany. A six-month phony war followed that ended in the spring 1940 when German troops struck west through the Low Countries forcing the British evacuation at Dunkirk

⁸⁰ For a complete review of Roosevelt and isolationism, see W. S. Cole, *Roosevelt and the Isolationists, 1932-1945* (Lincoln: University of Nebraska Press, 1983).

⁸¹ M. S. Sherry, *The Rise of American Air Power, The Creation of Armageddon* (New Haven: Yale University Press, 1987), pp. 79-81.

⁸² 53 Stat. 811, Public Law 117, 76th Congress, 1st Session, 6/7/1939, USNPR0005265-7 at USNPR0005265.

⁸³ 53 Stat. 811, Public Law 117, 76th Congress, 1st Session, 6/7/1939, USNPR0005265-7 at USNPR0005265; and *Industrial Mobilization for War, History of the War Production Board and Predecessor Agencies, vol. 1, Program and Administration* (1945; reprint New York: Greenwood Press, 1969), p. 73.

and then the French surrendered in June.⁸⁴ In response to European events, President Roosevelt took cautious steps to mobilize the American economy.

In April 1939, the ANMB reorganized and created multiple divisions. The Coordinating Divisions, Liaison Division, and Staff Divisions reported to the Assistant Secretaries of the Army and Navy. The three Coordinating Divisions were the Commodities Division, the Facilities Division, and the Plans Division. The Commodities Division was comprised of the Minerals and Metallic Raw Materials Section, the Chemicals Section, and the Animal and Vegetable Raw Materials Section. The Liaison Division coordinated with other federal agencies. The Facilities Division dealt with industrial surveys, allocations, and construction. The responsibilities of Plans Division were requirements, standards, and procurement.⁸⁵

The June 1940 ANMB Circular No. 1 stated that the mission of the Commodities Division was to “advance material readiness for national defense by conducting studies and formulating plans pertaining to commodities, particularly those classified as strategic and critical in order to assure an adequate supply of the materials essential to national defense in time of a major emergency.”⁸⁶ The activities were to be directed toward planning for procurement of such materials, development of control measures for commodities, and the collection and tabulation of data regarding requirements, sources of supply, stocks, and substitutes. There were to be numerous commodities committees within the division. The circular identified fourteen strategic materials, including chromium, and fifteen critical materials. In addition, there were forty-eight commodities under surveillance by the Board’s “surveillance list,” that the circular noted could become strategic or critical.⁸⁷ Throughout World War II, the three grades of chromite were among dozens of “strategic and critical minerals and metals required for essential uses in the war emergency and for essential civilian supply.”⁸⁸

⁸⁴ The “Phony War” refers to the months between Germany’s invasion of Poland at which time France and Great Britain declared war on Germany in the fall of 1939 and the spring of 1940 when Hitler turned his forces westward.

⁸⁵ ANMB, Commodities Annex to the Industrial Mobilization Plan, 4/1939, PPGNPR0558427-46 at PPGNPR0558430-36.

⁸⁶ ANMB, Commodities Division, A.&N.M.B. Circular No. 1, *Outline for Commodity Committee Procedure*, 6/1/1940, PPGNPR0008942-59 at PPGNPR0008943.

⁸⁷ ANMB, Commodities Division, A.&N.M.B. Circular No. 1, *Outline for Commodity Committee Procedure*, 6/1/1940, PPGNPR0008942-59 at PPGNPR0008943.

⁸⁸ H. Young to C. Wilson, “Minerals and Metals,” Estimated Supply and Requirements, 1943-1944, 12/21/1943, USNPR0005630-33 at USNPR0005633. See also Joint Committee of War Production Board, War Department, and Navy Department for Critical Materials and Products, Critical Materials and Products, 7/1/1945, PPGNPR0029107-11 at PPGNPR0029110; ANMB, Commodities Division, Strategic and Critical Materials, 8/25/1942, USNPR0003824-27 at USNPR0003824; C. Wilson to All Vice Chairmen, WPB, Revised List of Essential and Critical Materials, 4/25/1944, USNPR0005570-71; ANMB, Current List of Strategic and Critical Materials, 11/20/1944, USNPR0003865-68; ANMB, Strategic Materials, 1/2/1945, USNPR0005399-415; WPB, For

On September 8, 1939, after the German invasion of Poland, Roosevelt issued a proclamation and executive order. Proclamation 2352 proclaimed a “National Emergency in Connection with the Observance, Safeguarding, and Enforcement of Neutrality and the Strengthening of the National Defense Within the Limits of Peace-Time Authorizations.”⁸⁹ Historians and others often refer to this proclamation as the “Declaration of Limited National Emergency.” Also on September 8, 1939, Roosevelt issued Executive Order 8248 that further delineated executive branch responsibilities. Although the order did several things, among the most important was the establishment of a White House Office that included presidential secretaries, an executive clerk, and administrative assistants all who would answer directly to the president in his day-to-day responsibilities. Executive Order 8248 also created the Bureau of the Budget within the White House and charged it with oversight of the federal budget. The Bureau of the Budget was to work with federal agencies and advise the president on budgetary issues. Finally, the executive order gave the president—in times of national emergency—the authority to create an office within the White House as an “office for emergency management.”⁹⁰ Given that the president declared a national emergency on September 8, the condition had been met for him to create an office of emergency management.

4. The End of the “Phony War” and the United States Responses

On May 28, 1940, in response to the German invasion of the Low Countries and France, President Roosevelt revived the Advisory Commission to the Council on National Defense (NDAC), and appointed the seven members of the Commission as advisors on various aspects of industrial mobilization.⁹¹ “It is the function of the Advisory Commission to facilitate the production of materials and machines to meet the material requirements of the military branches of the Government on schedule, and to investigate problems affecting production and the effects of the defense program upon the economic life of the country. Particular attention is given to situations or ‘bottlenecks’ which may prevent the production of adequate materials to meet the requirements.”⁹² Based on such investigations, the Commission was to “make

Immediate Release, Critical Materials and Products, 7/28/1945, PPGNPR0028787-91; and ANMB, Current List of Strategic and Critical Materials, 1/14/1946, PPGNPR0558089-92.

⁸⁹ Franklin Roosevelt: “Proclamation 2352 – Proclaiming National Emergency in Connection with the Observance, Safeguarding, and Enforcement of Neutrality and the Strengthening of the National Defense Within the Limits of Peace-Time Authorizations,” 9/8/1939. Online by Gerhard Peters and John T. Woolley, *The American Presidency Project*. <http://www.presidency.ucsb.edu/ws/?pid=15806>.

⁹⁰ Executive Order 8248, 9/8/1939, F. R. 3864-65. The order also established the National Resource Planning Board, the Liaison Office of Personnel Management, and the Office of Government Reports.

⁹¹ *Minutes of the Advisory Commission to the Council of National Defense, June 12, 1940, to October 22, 1941* (Washington, DC: GPO, 1946), PPGNPR0009380-90 at PPGNPR0009382.

⁹² *Handbook of the Advisory Commission to the Council of National Defense, 9/1940*, PPGNPR0009365-77 at PPGNPR0009370.

recommendations to the President and the heads of executive departments” regarding various parts of the economy that could become problematic, including production of a myriad of industrial materials, railroads and transportation facilities, seagoing transportation, and the gathering and dissemination of information as to supplies and requirements.⁹³ Advisory Commission activities also included reports relating to recommendations for the acquisition of tonnages of metallurgical chromite, chemical chromite and refractory chromite.⁹⁴

As had occurred during World War I, each of the NDAC’s seven members had a general area of responsibility. Two of the leading members had strong ties with American business and industry. William Knudsen, the President of General Motors and a mass production expert, became responsible for industrial production. Edward Stettinius also had worked for General Motors before a short stint as a New Dealer. Stettinius left government service in 1934 and went to United States Steel where he became president in 1938. Stettinius was in charge of the NDAC’s materials division, which was responsible with overseeing raw materials. Labor had a voice on the NDAC in Sidney Hillman, who served as head of the Amalgamated Clothing Workers of America beginning in 1915. In 1937, Hillman helped organize the Congress of Industrial Organizations (CIO). These three divisions—industrial production, the materials division, and labor—were the three most important areas of the NDAC.⁹⁵ The other five members and their areas of responsibility were: Leon Henderson (price stabilization); Chester Davis (farm products); Ralph Budd (transportation); Harriet Elliott (consumer protection); and Donald Nelson (coordinator national defense purchases).⁹⁶ Initially only Knudsen, Stettinius, and Hillman served fulltime. As one historian recently wrote, “NDAC’s job role was to translate defense appropriations into actual factory operations as quickly as possible, preferably within six months.”⁹⁷

In June 1940, as the fall of France loomed, the pace of events in the United States to transform the government and economy that had been formerly devoted to peacetime production, but now to military production, quickened. In June, President Roosevelt appointed Republicans Henry Stimson and Frank Knox to the positions of Secretary of the Army and Secretary of the Navy, respectively, creating a bipartisan war cabinet. On June 25, Congress took action when it

⁹³ *Handbook of the Advisory Commission to the Council of National Defense*, 9/1940, PPGNPR0009365-77 at PPGNPR0009370.

⁹⁴ Leith to Batt, 11/30/1940, PPGNPR0962401-02. Also see May to Burton, 7/28/1944, PPGNPR0962403-04.

⁹⁵ M. Klein, *A Call to Arms: Mobilizing America for World War II* (New York: Bloomsbury Press, 2013), pp. 84-90. For more on Knudsen see, Arthur Herman, *Freedom’s Forge, How American Business Produced Victory in World War II* (New York: Random House, 2012).

⁹⁶ R. Smith, *United States Army in World War II*, 103. Also see, *Handbook of the Advisory Commission to the Council of National Defense*, 9/1940, PPGNPR0009365-77.

⁹⁷ Klein, *A Call to Arms*, p. 87.

passed 54 Stat. 572, revising the charter of the Reconstruction Finance Corporation (RFC).⁹⁸

In 1932, Congress had created the RFC to make loans during the Great Depression. In fact, in May 1938, Natural Products Refining Company had applied for a \$200,000.00 RFC loan. In November 1938, the loan amount was reduced to \$150,000.00 and the RFC approved a loan for that amount before it was rescinded altogether on February 1, 1939.⁹⁹

On June 25, 1940, Public Law No. 664 authorized the RFC to aid in the “national-defense program” by organizing corporations with the power to produce, acquire, and carry strategic and critical materials as defined by the President.¹⁰⁰ Any such corporation was “authorized, with the approval of the President, to make payments against the purchase price to be paid for strategic and critical materials in advance of the delivery of such materials.”¹⁰¹

This law also amended the Reconstruction Finance Corporation Act of 1932 to include certain additional RFC duties: “for plant construction, expansion and equipment, and working capital” for “the manufacture of equipment and supplies necessary to the national defense.”¹⁰²

With these new powers, the RFC eventually established eight wartime subsidiaries, including the Metal Reserve Company (MRC), which the RFC chartered on June 28, 1940.¹⁰³ Section three of the MRC charter read,

[t]he objects and purposes of the Corporation shall be to perform all acts and transact all business which is permitted legally to be done, performed, and transacted in connection with the buying, selling, acquiring, storing, carrying, importing, exporting, producing, processing, manufacturing and marketing of . . . as well as similar materials and substances . . .¹⁰⁴

Chromium was among the fourteen items listed after the section on “buying, selling, acquiring...) and under “critical materials” tanning materials appeared. The RFC authorized the

⁹⁸ 54 Stat. 572.

⁹⁹ Natural Products Refining Company – Jersey City, New Jersey, 2/1/1939, USNPR0001524. The reason for the rescinding of the loan is unknown, although a possible explanation is that one of the conditions of the loan is that the total annual compensation for Henry Goman and Stanley Weil, who were to guaranty the loan, could not exceed \$30,000.00.

¹⁰⁰ Public Law No. 664, 6/25/1940, USNPR0005268-70 at USNPR0005269.

¹⁰¹ Public Law No. 664, 6/25/1940, USNPR0005268-70 at USNPR0005270.

¹⁰² Public Law No. 664, 6/25/1940, USNPR0005268-70 at USNPR0005269.

¹⁰³ F. R. 6/19/1941, 2970-71.

¹⁰⁴ F. R. 6/19/1941, 2970-71.

MRC to enter into contracts and to buy and sell real and personal property necessary for conducting business.¹⁰⁵

In the eighteen months between its establishment in June 1940 and Pearl Harbor in December 1941, the MRC's primary goal was stockpiling supplies of metals and minerals to ensure an adequate supply if war interrupted normal supply lines. The MRC worked with the ANMB and NDAC in determining the amounts of metals and minerals to purchase and stockpile. In October 1940, for example, the MRC advised a member of the Senate that NDAC recommend the purchase of metallurgical ore (329,120 long tons), chemical ore (220,000 long tons), and refractory ore (170,000 long tons).¹⁰⁶ When war did interrupt normal supply lines, the MRC started purchasing metals and minerals at prices above market value and then reselling them at lower prices that fell within the World War II price control framework. The MRC acted quickly in fulfilling its mission. In November 1942, not yet one year after Pearl Harbor, the Secretary of Commerce reported on the status of the RFC and its corporations. The Secretary stated that in the two-and-half years since its creation, the MRC had made commitments exceeding \$3.2 billion for numerous commodities, which included more than \$65 million "for chrome, chrome concentrates, and chrome ore."¹⁰⁷ By February 1943, the MRC had already purchased volumes of thirty-seven different commodities, including chromite. In 1944, the President of the MRC reported that by selling below purchase price during the war helped lower inflationary pressure. At one point during the war, the MRC purchased chrome ore at \$80.00 a ton, only to sell it to for \$43.50 per ton.¹⁰⁸

A circa 1945 Report on Activities of MRC from June 28, 1940 to November 1, 1944, described the contribution of the MRC to the war program in four major categories: (1) creating stockpiles of metals and minerals that provided assurance for continued production of military goods, regardless of possible interruption in supplies; (2) assisting in increasing the total volume of metals and minerals flowing into the war effort by making available to industry, on allocation by the War Production Board (WPB), through the "purchase and sale of [such] commodities;" (3) helping to stabilize the prices at which metals and minerals were made available to the war effort "by selling to industrial consumers at OPA ceiling prices. . . reducing the spread of inflationary trends in the war economy" seen during World War I; and (4) reducing the strength

¹⁰⁵ F. R. 6/19/1941, 2970-71.

¹⁰⁶ J. Morton, Memorandum for Senator Henderson, 10/16/1940, USNPR0001626-27. Also see, C. Leith to Office Files, 11/21/1940, regarding a meeting attended by members of MRC, ANMB, and NDAC, USNPR0000023-26. As the content of the memorandum indicates, the three organizations did not always agree on purchases.

¹⁰⁷ Secretary of Commerce to the President and the Congress of the United States, 11/30/1942, USNPR0005496-5503 at USNPR0005500.

¹⁰⁸ S. Strauss to Mr. Clayton, 2/13/1943, USNPR0005306; C. Henderson, Report on Activities of Metals Reserve Company, From June 28, 1940 to November 1, 1944, USNPR0002390-427 at USNPR0002390-91; and Secretary of Commerce to the President, 5/7/1943, USNPR0005124-26.

of the enemy by buying up supplies available to it. At the time of the report, MRC was purchasing and stockpiling forty-nine different commodities.¹⁰⁹

This MRC Report also stated that the responsibilities of its legal division included participating in the negotiation of and preparation of contracts for “treatment and toll arrangements” as well as for “sales arrangements.”¹¹⁰

The RFC’s chartering of the MRC underscored the fundamental need for raw materials as the United States moved to a wartime economy. NDAC’s William Knudsen stated this when he said, “[e]verything is a raw material until I get ready to cut it up.” An Army general noted, “[t]he ultimate bottleneck is raw materials . . . that is what will decide how much munitions we can produce.”¹¹¹ War changed the supply dynamic: “transforming surpluses into shortages and unmasking shortages of essential ingredients,” including chromium from South Africa, New Caledonia, and the Philippines.¹¹² The day after Pearl Harbor an Army major working for the ANMB board wrote a “memorandum for file” that discussed the status of stockpiles of seven “strategic and critical materials” whose future procurement was “affected by the recent developments in the Pacific.” Chromium was second on the list.¹¹³ Once the United States became a direct combatant, the purpose of the MRC was to minimize such shortages in order to prevent slowdowns or stoppages of defense production.¹¹⁴

The MRC’s May 1941 “Procedure in Purchases and Sales” provided in part for the following “procedure of operation”:

1. President defines a material as being strategic and critical.
2. OPM recommends quantity of the material MRC should purchase.
3. MRC purchases at current prices the quantity of such material available considering the requirements of industry and governmental departments.
4. The material is stockpiled by MRC.
5. When the material is required to be used for defense, the President and the Federal Loan Administrator request MRC to make the material available to industry or government departments.
6. The OPM is advised of all requests to

¹⁰⁹ C. Henderson, *Report of the activities of the Metals Reserve Company from 6/28/1940 to 11/1/1944*, USNPR005151-90 at USNPR005153-59 and USNPR005181-83.

¹¹⁰ C. Henderson, *Report of the activities of the Metals Reserve Company from 6/28/1940 to 11/1/1944*, USNPR005151-90 at USNPR005177-79.

¹¹¹ As quoted in Klein, *A Call to Arms*, p. 75.

¹¹² Klein, *A Call to Arms*, pp. 75-76

¹¹³ J. Weller, “Memorandum For File,” 12/8/1941, USNPR0009022-24.

¹¹⁴ The Navy also maintained a small stockpile of chromium ore at Fort Mifflin in Philadelphia, see R. Gardiner, Memorandum for File, 1/21/1942, PPGNPR0001325; and R. McDowell to E. Hogan, 12/12/1942, PPGNPR0001324.

purchase material received by MRC. 7. OPM recommends to MRC the quantity and the party to whom the material is to be sold. 8. Metals Reserve Company sells the material to the recommended party in the amount indicated by OPM.¹¹⁵

In order to increase the nation's supply of chromate, the MRC purchased the ore and then stored it at government stockpiles. When a company such as Natural Products needed chromate, the contract it signed with the MRC contained language explaining that the ore would be shipped from the government stockpile. For example an April 1944 MRC-Natural Products contract read, in part, "entire quantity is available for prompt shipment from Seller's Baltimore, Maryland Stockpile."¹¹⁶ Correspondences between Natural Products also referenced the Baltimore stockpile. In addition to the Baltimore stockpile, the MRC stockpiled ore in Niagara Falls, NY and at Giard Point in Philadelphia, PA.¹¹⁷ "The emergency of war" dictated the location of stockpiles and they were not located at "customary unloading docks."¹¹⁸

Natural Products signed multiple contracts with the MRC for the purchase of chromite between June 1943 and February 1946. At least fifteen of the contracts are extant. The contracts followed a standard form that listed the MRC as the "Seller" and NPRC at the "Buyer." Contracts stated that NPRC was purchasing "Transvaal Grade B chrome ore" and the amount of ore purchased. The contracts discussed shipment and delivery. If stated, the MRC stockpile in Baltimore was usually the shipping point although NPRC did receive one shipment from the Philadelphia stockpile. Delivery dates of shipments were sometimes listed. For example, in NPRC's first contract signed in June 1943, 2,500 long tons were scheduled for delivery in June and July 1943 followed by 2,000 long tons in August. A "Quality" section listed the expected assay results of the ore. In all of the contracts the price per long ton was \$43.50 with a price adjustment clause if the percentage of chrome varied up or down from forty-eight percent. Under terms of the delivery clause, the ore would "be delivered f.o.b. railroad cars at Buyer's Jersey City, New Jersey Plant."¹¹⁹

¹¹⁵ MRC, "Procedure In Purchases and Sales," 5/8/1941, USNPR0005666-68 at USNPR0005667.

¹¹⁶ MRC-Natural Products Contract, 4/18/1944, USNPR0000043. Also see, MRC-Natural Products Contract, 12/8/1943, USNPR0000046; MRC-Natural Products Contract, 10/6/1943, USNPR0000047; MRC-Natural Products Contract, 5/28/1943, USNPR000048; and Strauss to H. Smith, 8/17/1944, USNPR0004367.

¹¹⁷ G. Temple to Natural Products Refining Company, 12/1/1943, PPGNPR0015123; and S. Strauss to Mutual Chemical Co., 3/24/1944, USNPR0004543. For reference to Giard Point see MRC-Natural Products Contract 10-19-1945, USNPR0000032; and WPB to S. Strauss, 10/9/1945, USNPR0000075.

¹¹⁸ K. Anderson to General Refractories Co., 1/6/1944, USNPR000212-13.

¹¹⁹ MRC-NPRC Contract 6/8/1943, USNPR0000048; MRC-NPRC Contract, 10/2/1943, USNPR0000047; MRC-NPRC Contract, 12/8/1943, USNPR0000046; MRC-NPRC Contract, 4/18/1944, PPGNPR0001923-24; MRC-NPRC Contract, 6/13/1944, PPGNPR0001921-22; MRC-NPRC Contract, 8/3/1944, USNPR0000040-42; MRC-NPRC Contract, 9/19/1944, PPGNPR0001917-18; MRC-NPRC Contract, 10/21/1944, USNPR0000038-39; MRC-NPRC Contract, 12/12/1944, USNPR0000037; MRC-NPRC Contract, 2/28/1945, USNPR0000036; MRC-NPRC Contract, 4/19/1945, USNPR0000034-35; MRC-NPRC Contract, 6/21/1945, USNPR0000033; MRC-NPRC Contract, 10/19/1945, USNPR0000032; MRC-NPRC Contract, 1/3/1946, USNPR0000031; and MRC-NPRC

Although NPRC contracted with the MRC for ore purchases, pursuant to wartime policy the WPB needed to give prior approval for any purchases as part of that agency's general economic oversight. Documents from January and February 1945 illustrate this process. In late January, the WPB informed the MRC that Natural Products had "requested an allocation of approximately 3,600 long dry tons . . . delivery to be made . . . in late March or early April 1945." The WPB letter continued, "[p]ursuant to Order M-18-a, we recommend that Metals Reserve Company arrange for the sale and delivery of this ore."¹²⁰ After the MRC received WPB's permission to sell ore to Natural Products, it prepared a contract and sent it to the company for approval. On February 23, 1945, Natural Products wrote MRC and returned signed copies of the contract. Natural Products asked that the ore be delivered in "bottom dumping coal cars" and noted that the railroad cars "are to be consigned to us at our Garfield Avenue siding."¹²¹ The MRC then returned an executed contract to Natural Products.¹²²

Three days after amending the RFC charter, Congress again acted to strengthen the defenses of the United States. On June 28, 1940, Congress passed an act "to expedite national defense, and for other purposes."¹²³ Section two of the act addressed Army and Navy orders and authorized the president, at his discretion, to require that such orders take priority over orders of private concerns or for export during the national emergency declared on September 8, 1939.¹²⁴ Congress also inserted language barring the use of "cost-plus-a-percentage-of-cost" contracts for Army or Navy contracts. The government issued that type of contract during World War I and its use was considered a source of inflationary pressure during that war. Congress did allow for "cost-plus-a-fixed-fee" contracts, which were widely used during World War II. The legislation capped the fixed fee at 7 percent of the contract. Finally, Congress empowered the Secretary of the Navy, at the direction of the president, "to take over and operate such plant or facility" as deemed necessary for national defense. The Secretary would determine the amount of

Contract, 2/15/1946, USNPR0000030; and MRC-NPRC Contract, unexecuted version of 10-2-1943 contract, PPGNPR0001925-26.

¹²⁰ WPB to Strauss, 1/26/1945, USNPR0000112. See also WPB to G. Bridgman, 5/18/1943, USNPR0000257; WPB to G. Bridgman, 8/12/1943, USNPR0000045; WPB to S. Strauss, 3/18/1944, USNPR0000197; WPB to S. Strauss, 9/23/1944, PPGNPR0011814; WPB to S. Strauss, 4/12/1945, USNPR0000101; WPB to S. Strauss, 6/9/1945, USNPR0000093; WPB to S. Strauss, 10/9/1945, USNPR0000075; CPA to S. Strauss, 12/28/1945, USNPR0000067; CPA to M. Levinson, 1/28/1946, USNPR0000055.

¹²¹ Stanton to MRC, 2/23/1945, USNPR0000108.

¹²² Straus to NPRC, 3/1945, USNPR0000107; and MRC-NPRC Contract, 2/28/1945, USNPR0000036.

¹²³ 54 Stat. 676.

¹²⁴ 54 Stat. 676.

compensation that the government would pay the owner(s).¹²⁵

Congress continued to respond to world events in the summer of 1940. On July 2, it passed another act to strengthen the national defense, streamlining the authority of the Secretary of War to modernize military facilities and to develop and acquire military equipment. Section six of the Act of July 2 empowered the president to “prohibit or curtail” exports of military equipment, munitions, parts, machinery, tools, materials and supplies for the “manufacture, servicing, or operation thereof.”¹²⁶ Following passage of the act, an exporter could only export designated items if he or she had received a license from the Department of State. Most items on the ANMB strategic and critical materials list soon fell under the purview of the export law. The law not only served to strengthen the United States’ defenses, but potentially weakened potential adversaries by denying them needed materials.¹²⁷

Although Congress had passed legislation requiring that industry give preference to military orders, a system was not yet in place to assure the proper distribution of materials needed for defense production. That began to occur in August 1940 when the ANMB issued the first priority system establishing ten categories from A1 through A10, with A1 being the highest priority. An AA rating existed, but only material needed for an emergency received this designation. The government later divided the A-1 class into ten subgroups from A-1-a to A-1-j. The government also added classes B through D for material deemed less essential.¹²⁸

The purpose of the priority system was to ensure that scarce materials of all kinds—including raw materials, semi-finished, and finished goods—were distributed in a manner that guaranteed that material needed for national defense received a higher priority rating than material designated for non-defense uses. For example, a wire and cable manufacturer producing cable for naval ships received copper before a company that manufactured wire for home use. Two years after the ANMB issued the first priorities, a War Production Board (WPB) publication noted, “the Priorities System is the primary method of controlling the flow of materials and finished products in the war economy.”¹²⁹

¹²⁵ 54 Stat. 676. On May 31, 1941, Congress amended the Act to Expedite National Defense. Congress expanded the language of the act to include all contracts, not just those with the Army or Navy, deemed essential for national defense, extended the terms to subcontractors, and included any order from a foreign government who the president considered critical under the Lend Lease Act of March 11, 1941. Congress also gave the president the authority to allocate any material in short supply that he considered vital to the public good and the nation’s defense (55 Stat. 236).

¹²⁶ 54 Stat. 712.

¹²⁷ P. Koistinen, *Arsenal of World War II, The Political Economy of American Warfare, 1940-1945* (Manhattan, KS: University Press of Kansas, 2004), p. 267.

¹²⁸ Smith, *United States Army in World War II*, pp. 505-27, especially pp. 509-11.

¹²⁹ WPB, Division of Information, “Priorities and Industry,” 8/1942, PPGNPR0963143-68 at, PPGNPR0963145.

5. The Selective Training and Service Act of 1940

By the end of the summer of 1940, Congress and the military had taken significant steps to improve the defenses of the United States, including the revival of the NDAC, changing the charter of the RFC, passage of legislation regarding scarce and critical materials, granting the president the authority to allocate materials, requiring military orders take precedent over civilian orders, and formulation of the first priority system. Yet, a glaring weakness plagued the United States in the eyes of those who thought the nation must take steps to prepare for possible war. The United States Army and Navy were among the smallest of any industrialized nation. In the summer of 1940, the regular Army had 280,000 men, placing it eighteenth behind even Holland, Belgium, and traditionally neutral Switzerland. Germany, at the time, counted between five and six million men in uniform.¹³⁰ Discussions concerning a peacetime draft began in the summer of 1940 and gained momentum when two congressmen introduced legislation calling for a draft.¹³¹

President Roosevelt favored national conscription and had wanted a plank calling for the draft in the 1940 Democratic Party Platform. When that failed, he remained largely silent on the issue fearing an election-day backlash. Secretary of War Stimson and Army Chief of Staff George Marshall, among others, favored the draft. Debate on the draft carried into September as the war in Europe worsened. By mid-September, the German bombing of Britain was entering its second month and Italian troops entered Egypt. Against that backdrop Congress passed the nation's first peacetime draft law on September 14.¹³²

In summary, Section Nine of the Act authorized the president, through the Secretaries of War or Navy, to place "orders" with business and industry accustomed to manufacturing whatever might be contained in the order. Compliance was obligatory. If a company refused to comply with the provisions of the statute, the president through the Army, Navy, or other agency could "take immediate possession of any such plant or plants" and the ownership faced a fine up to \$50,000.00 and possibly three years in jail. If that occurred the government would pay "fair and just" compensation.¹³³ By virtue of this section, the President was,

empowered, through the head of the War Department or the Navy Department . . .
in addition to the present authorized methods of purchase or procurement, to place
an order with any individual . . . or [business] . . . for such product or material as

¹³⁰ Klein, *A Call to Arms*, p. 59. Also see, K. Eiler, *Mobilizing America, Robert P. Patterson and the War Effort, 1940-1945* (Ithaca, Cornell University Press, 1997), p. 43.

¹³¹ Klein, *A Call to Arms*, p. 81.

¹³² Klein, *A Call to Arms*, p. 83.

¹³³ 54 Stat. 885, USNPR0008855-61 at USNPR0008858A.

may be required, and which is of the nature and kind usually produced or capable of being produced by such[person]. Compliance with all such orders for products or material shall be obligatory [on any such person] . . . and shall take precedence over all other orders and contracts theretofore placed with such [person].¹³⁴

If any such person then “refuse[d] to give to the United States such preference in the matter of the execution of orders or . . . refuse[d] to manufacture the kind, quantity, or quality of arms or ammunition, or the parts thereof, or any necessary supplies or equipment, as ordered by the Secretary of War or the Secretary of the Navy, or . . . refuse[d] to furnish such arms, ammunition, or parts of ammunition, or other supplies or equipment, at a reasonable price as determined by the Secretary of War or the Secretary of the Navy, . . . then . . . the President, . . . [was] . . . authorized to take immediate possession of any such plant or plants, and through the appropriate branch, bureau, or department of the Army or Navy to manufacture therein such product.”¹³⁵

The act further provided in Section 9 that any person who “fail[ed] to comply with the provisions of this section shall be deemed guilty of a felony, and upon conviction shall be punished by imprisonment for not more than three years and a fine not exceeding \$50,000.” “The compensation to be paid to any such person for its products or material, or as rental for use of any manufacturing plant while used by the United States, [was to] be fair and just.”¹³⁶

No evidence has been found to indicate that either the War Department or the Navy Department ever issued any such obligatory order to NPREC, that NPREC ever refused to manufacture chromium chemicals under any circumstances during World War II, or that either the War Department or the Navy Department ever took possession or threatened to take possession of the company’s Garfield Avenue plant.

Within a few weeks of the passage of the Selective Service Act, Roosevelt wrote Secretary of War Stimson and outlined a general policy concerning the implementation of Section Nine. The president wanted NDAC to review all proposed mandatory War Department purchase and procurement orders. If NDAC, “with the voluntary cooperation of industry,” could not arrive at a means to fill such orders then the “case” was to be returned to the Secretary. If a

¹³⁴ 54 Stat. 885, USNPR0008855-61 at USNPR0008858A.

¹³⁵ 54 Stat. 885, USNPR0008855-61 at USNPR0008858A; Klein, *A Call to Arms*, p. 59; and Eiler, *Mobilizing America*, p. 69. At the time of the passage of the Selective Service Act, private enterprise refusing orders had not been a problem as the country slowly mobilized. However, there had been instances when property owners, learning that the government might be interested in purchasing real estate, raised prices to exorbitant levels. In those circumstances, the government might resort to condemnation hearings to acquire property. Other times owners of machine tools and raw materials refused to sell. See, Klein, *A Call to Arms*, p. 59; and Eiler, *Mobilizing America*, p. 69.

¹³⁶ 54 Stat. 885, USNPR0008855-61 at USNPR0008858A.

person refused to fill a mandatory order then NDAC and the Secretary were instructed to refer the matter to the President with recommendations for action.¹³⁷ Despite the language of the Selective Service Act, “the policy of the War Department [was] to continue procurement under the defense program on the basis of voluntary cooperation between industry and the Government whenever possible.”¹³⁸

In fact, the government rarely used its seizure power during the war. From 1941 through 1945, there were sixty-four instances when either President Roosevelt or President Truman issued an executive order authorizing the seizure of a plant. All but seven were because of labor issues, usually strikes, which interrupted production. In June 1945, one such strike stopped production at the Diamond Alkali facility in Painesville, Ohio. The Diamond Alkali strike lasted one month—from June 18 to July 18, 1945 and impacted 2,700 workers.¹³⁹ On June 18, 1945, President Truman issued Executive Order 9574 that directed the Secretary of the Army to take control of the plant because “a labor disturbance” threatened “production of articles and materials that are required for the war effort.”¹⁴⁰

Congress amended section nine of the Selective Service Act in June 1943 when it passed, over presidential veto, the War Labor Disputes Act. Specifically, section three of the War Labor Disputes Act expanded section nine so that it applied to “any plant, mine, or facility equipped for the manufacture, production, or mining any articles or materials” where a disruption of work “unduly impeded” the war effort.¹⁴¹ The act further stated that such a seizure could last no longer than sixty days.¹⁴² Roosevelt’s veto of the act reveals his attitude toward wartime strikes. Roosevelt noted that except for the United Mine Workers, both labor and business had adhered to the “No Strike, No Lock” out pledge made immediately after Pearl Harbor. The president noted that the total hours lost to strikes in 1942 “averaged only five one-hundredths of 1 percent.” Although he favored most of the bill, and vowed to use governmental power to prevent strikes from disrupting production for the war, Roosevelt vetoed the bill because of two provisions. He opposed section eight that required union representatives to notify government officials of a potential strike, which the president thought might actually hasten strikes, and

¹³⁷ F. Roosevelt to H. Stimson, 9/26/1940, USNPR0008973.

¹³⁸ J. Schuls to The Chief of the Air Corps et. al., 10/17/1940, USNPR0008964-65 at USNPR0005964.

¹³⁹ J. Ohly, *Industrialists in Olive Drab, The Emergency Operation of Private Industries During World War II* (Washington, D.C.: Center of Military History, 1999), Appendix C and p. 315, USNPR0000983-1112 at USNPR0001067, USNPR0001072. A seizure often involved more than one plant. The most extreme example of this occurred beginning on December 27, 1943 and lasted until January 18, 1944 when the government “seized 565 railroads” (Ohly, *Industrialists in Olive Drab*, Appendix A).

¹⁴⁰ Executive Order 9574, 6/18/1945, FR 10, p. 7435.

¹⁴¹ 57 Stat. 163.

¹⁴² 57 Stat. 163.

section nine which barred political contributions.¹⁴³

On October 21, 1940, Roosevelt took additional action toward improving the priority system when he issued Executive Order 8672 that vested the authority that he had received to determine priorities under the Act to Expedite National Defense in late June to Donald Nelson of NDAC. NDAC's priorities board had designated Nelson as the "Administrator of Priorities."¹⁴⁴ Although Roosevelt's action strengthened NDAC, it contributed to the early mobilization problems as it essentially created a second agency to issue priorities, the other being the ANMB. This sort of overlapping and potentially conflicting authority hampered economic growth from 1940 into late 1942.

6. Toward More Centralized Federal Economic Planning: OPM and SPAB

The president, the Congress, the Army and Navy, NDAC, and business and industry had done much in 1940 toward wartime preparation, yet no one among those advocating preparedness seemed satisfied. Historian Maury Klein's title for the last chapter of section one of his recent book, *A Call to Arms* is "Making Haste Slowly" and ably summons up the thoughts of many as 1940 ended.¹⁴⁵ So much had been done, but so much remained. To many, the primary concern was lack of a centralized planning organization to oversee production, purchasing, and priorities. To that end, Roosevelt announced on December 22, 1940, the creation of the Office of Production Management (OPM). Roosevelt vested leadership of the OPM in four individuals. William Knudsen, who had been heading up production under NDAC, was considered the person in charge. Secretary of War Stimson and Secretary of Navy Knox also served, as did Sidney Hillman to give labor a voice.¹⁴⁶

Roosevelt formally created the OPM on January 7, 1941, when he issued Executive Order 8629, "Establishing the Office of Production Management [OPM] in the Executive Office of the President and Defining Its Functions and Duties." Section two (a) addressed production and called on the OPM to "formulate and execute" plans to increase production for the national defense. Section two (d), addressed raw material and instructed the OPM to take the necessary steps for "an adequate supply of raw materials essential" for defense production. Section two (g) charged OPM with authority to determine priorities for deliveries of material as provided in the Act to Expedite National Defense approved June 28, 1940.¹⁴⁷

¹⁴³ 89 Cong. Rec. 6487, 6/25/1943. The president's veto message was contained therein.

¹⁴⁴ 5 Fed. Reg. 4199, 10/24/1940.

¹⁴⁵ Klein, *A Call to Arms*, p. 107.

¹⁴⁶ Klein, *A Call to Arms*, p. 107.

¹⁴⁷ 6 Fed. Reg. 191, 1/7/1941, USNPR0008885-86.

OPM Regulation No. 3, dated March 8, 1941, stated that the agency was charged by this Executive Order with the duties of administering the priorities to be accorded to deliveries of material, and to perform the functions and exercise the authorities vested in the President by Section Nine of the Selective Training and Service Act of 1940. This regulation defined these as responsibilities of the OPM Division of Priorities, and authorized the Director of Priorities to establish an organization within OPM to perform them. The responsibilities included assignment of preference ratings to all contracts and subcontracts necessary to the defense program, issuance of preference or priority certificates, and coordination and consultation with the other relevant agencies of the Government.¹⁴⁸

On August 28, 1941, the President issued Executive Order 8875, to define further OPM's functions and duties, particularly with respect to establishing priorities in the procurement and production of materials necessary for the national defense. This Executive Order also established the Supply Priorities and Allocations Board (SPAB), "in order to assure unity of policy and coordinated consideration of all relevant factors involved in the supply and allocation of materials and commodities among the various phases of the defense program and competing civilian demands," and described the executive agencies who provided its members.¹⁴⁹ The general plans and programs formulated by the OPM for allocations and priorities were made subject to the approval and modification of the SPAB.¹⁵⁰

A July 1941 report of the OPM Priorities Division for the first six months of its existence stated: "As our national defense program developed and the needs of foreign Governments under the Lend-Lease Program increased, it became increasingly apparent that supplies of many important materials would be insufficient for all military and civilian needs. In order to assure delivery of essential defense material at the time, in the quantities, and in the order necessary to carry out the defense program, it was necessary to have a centralized agency to control the flow of such material. . . . That is the primary function of the Priorities Division."¹⁵¹ This July 1941 report also stated: "This Division assumed the responsibility for overall supervision of the priorities system, including the balancing of military and nonmilitary needs and the imposition of industry-wide control when necessary."¹⁵² In sum, "[i]t is the function of the priorities system to insure deliveries of defense material at the times and in the quantities required by the defense

¹⁴⁸ OPM, Regulation No. 3, Defining the Status of the Division of Priorities in the Office Production Management and Prescribing Its Duties and Functions, 3/8/1941, PPGNPR0009641-45.

¹⁴⁹ Executive Order, Delegation and Coordination of Priority Authority, 8/28/1941, PPGNPR0009646-48 at PPGNPR0009647.

¹⁵⁰ Executive Order, Delegation and Coordination of Priority Authority, 8/28/1941, PPGNPR0009646-48 at PPGNPR0009647.

¹⁵¹ OPM, Priorities Division, *Report of Priorities Division, For Period January-June 30, 1941*, PPGNPR0963120-36, PPGNPR0963123.

¹⁵² OPM, Priorities Division, *Report of Priorities Division, For Period January-June 30, 1941*, PPGNPR0963120-36, PPGNPR0963123.

program and in their relative order of importance.”¹⁵³ The report also provided data on the estimated supply and requirements of twenty-nine materials, including chromite, for 1941 and 1942.¹⁵⁴

The SPAB was “a policymaking body authorized to: (1) Determine the total requirements of materials and commodities needed for military, defense aid, economic defense and civilian purposes; (2) Determine policies, and make regulations governing allocations and priorities with respect to the procurement, production, transmission, or transportation of materials, articles, power, fuel, and other commodities among military, economic defense, defense aid, civilian, and other major demands of the total defense program; (3) Distribute among competing uses the portion of the supply of materials and commodities available for civilian consumption; (4) Establish policies for the fulfillment of requirements. The Board utilizes the OPM to execute most of its decisions and to provide it with such services, personnel and facilities as the Board may require.”¹⁵⁵

Although the language of these documents suggest that centralized leadership for the mobilization effort had been established in the OPM, events in 1941 demonstrated a much different situation. Economic mobilization and wartime production continued to flounder in 1941, although strides were made. Problems associated with economic mobilization persisted, and the Administration was growing increasingly concerned over the lack of American production in support of Great Britain.¹⁵⁶

C. Chromium Preference and Allocation Orders

1. Order M-18, Order M-18-a and Order M-18-b

M-Orders were material orders, and governed the distribution or use of raw materials, e.g. copper, iron and steel, lumber, paper, etc. One type of M-Order was directed towards conservation, providing, for example, that copper, steel or leather could not be used in certain listed end-products. Other controls in such orders included inventory level restrictions, requirements that war orders must be filled first, rules that certain uses had preference over other uses in obtaining the regulated materials, requirements that purchase orders be filed with the WPB, and requirements that suppliers report their potential supply to the WPB and users report

¹⁵³ OPM, Priorities Division, *Report of Priorities Division, For Period January-June 30, 1941*, PPGNPR0963120-36, PPGNPR0963125.

¹⁵⁴ OPM, Priorities Division, *Report of Priorities Division, For Period January-June 30, 1941*, PPGNPR0963120-36, PPGNPR0963132.

¹⁵⁵ SPAB, Relationship of the Supply Priorities and Allocations Board to the Defense Program, circa 1941, USNPR0006752-57 at USNPR0006752.

¹⁵⁶ Eiler, *Mobilizing America*, pp. 209-16.

prospective demands, permitting OPM and later WPB to compare the total supply with the demand.¹⁵⁷

Pursuant to its authority to establish priorities in July 1941, the OPM issued General Preference Order M-18 designed to conserve the supply and direct the distribution of chromium in commerce,

Whereas it is found that there exist certain serious shortages of chromium, . . . which may increase in the future by reason of the fact that the present and future domestic supply and probable future imports are now and may be insufficient for all defense and civilian needs, and it is further found that such shortages will prevent the obtaining of priority for deliveries of that material under present and future Naval and Army contracts and orders and related subcontracts and suborders unless the total present and future supply thereof be conserved and the present and future distribution directed, and it is further found that the best interests of the national defense require the exercise of the power conferred upon [the Director of Priorities] to direct and insure such priority.¹⁵⁸

Conservation Order M-18 covered “chromite and chrome chemicals which were derived therefrom.” Under order M-18 companies could use the same amount of ore that they used between January 1 and June 30, 1941.¹⁵⁹

Between July 1941 and September 1943, Conservation Order M-18 underwent several revisions. On November 29, 1941, the OPM issued General Preference Order M-18-a that limited the amount of chromium any processor could use in a given month, and vested the Director of Priorities with authority to make allocations of chromium supplies by “specifically direct[ing] the manner and quantities in which deliveries of chromium in any form, for particular uses or to particular persons shall be made or withheld” in order to ensure “the satisfaction of all defense requirements of the United States.”¹⁶⁰

In January and February 1942, the OPM and its successor, the WPB, amended order M-18-a. These and later amendments of M-18-a, and the March 1942 issuance of General Preference Order M-18-b, regulated consumers and suppliers of chromium in all of its forms - ore, chemical, and metallic - in order to balance and allocate supplies among competing requirements by restricting deliveries and uses of such materials. These regulations did not govern or direct how the ores were processed, or how the chemicals were made. These

¹⁵⁷ WPB, Procurement Regulation, No. 16, Priorities, 01/15/1943, PPGNPR0560154-86 at PPGNPR0560186.

¹⁵⁸ Preference Order M-18, 7/7/1941, USNPR0001860-61.

¹⁵⁹ W. Healey, 9/7/1945, “History of Chrome Chemicals,” PPGNPR0008669-94 at PPGNPR0008669 and 8685.

¹⁶⁰ D. Nelson, General Preference Order No. M-18-a, 11/29/1941, USNPR0005903-04.

regulations did not address how chromium chemical manufacturing wastes were to be handled.¹⁶¹

2. General Allocation Order M-300, Schedule 62

By September 1943, a shortage of chrome chemicals developed, due to increased aircraft production that required chromic acid for plating and anodizing. Other chrome chemical uses included production of textiles, leathers, and camouflage. The U.S. also provided chrome chemicals to the Soviet Union through Lend Lease.¹⁶² This increased use led to the revocation of M-18-b in November 1944 and the placement of chromium under Schedule 62 to General Allocation Order M-300. Under Schedule 62 sodium bichromate, potassium bichromate, sodium chromate, potassium chromate, ammonium bichromate, chromic acid, and all chromium tanning compounds were all subject to allocation controls.¹⁶³ The WPB amended Allocation Order M-300, Schedule 62 several times before the end of the war.¹⁶⁴

3. Order M-63 and Order M-370

In December 1941, the bombing of Pearl Harbor, the German Declaration of War against the United States, and the United States' entry into the war as a combatant caused far greater urgency in the nation's war planning and mobilization efforts. As part of that urgency on December 27, 1941, OPM issued General Imports Order M-63. The order's preamble read,

War requirements have created a shortage of the materials hereinafter set forth for defense, essential civilian and other uses; such materials are imported and due to the

¹⁶¹ Amendment No. 2 to General Preference Order M-18-a, 1/13/1943, USNPR0003772-73; 7 Fed. Reg. 748, 2/5/1942, USNPR0001866-67; Summary of Allocation Controls, Chromium, 9/10/1942, USNPR0004588; WPB, M-18-a, 9/25/1943, USNPR0005909; and WPB, M-18-a, revocation, 8/1/1945, USNPR0005913; Supplementary Order M-18-b 3/26/1942, USNPR0000581-82; and Supplementary Order M-18-b, as amended, 6/27/1942, 7 Fed. Reg. 4835-36, 6/30/1942, USNPR0001870-71; Supplementary Order M-18-b, as amended, 9/30/1942, USNPR0005923, Supplementary Order M-18-b, as amended, 1/8/1943 USNPR0001873-74; Supplementary Order No. M-18-b, As Amended, 1/7/1943, USNPR0003790-91; Supplementary Order M-18-b is hereby amended 9/14/1943, USNPR0001876-78; Supplementary Order No. M-18-b, As Amended, 9/14/1943, USNPR0003785-89; Supplementary Order No. M-18-a, As Amended, 5/27/1943 USNPR0003806; Supplementary Order No. M-18-a, As Amended, 3/27/1943, USNPR0005915; Supplementary Order No. M-18-a, As Amended, 5/7/1943, USNPR0005914; Supplementary Order No. M-18-a, As Amended, 3/27/1944, Fed. Reg. 3298, 3/28/1944, USNPR0001880; Supplementary Order M-18-a, Revocation, 8/1/1945, USNPR0005916; and Supplementary Order M-18-a, as Amended, 9/14/1943, USNPR0005925-26.

¹⁶² Congress passed Lend Lease legislation in the spring of 1941. The program provided military aid to the nation's allies.

¹⁶³ General Allocation Order M-300, Schedule 62, FR 13131-32, 11/3/1944, USNPR0012404-05.

¹⁶⁴ WPB General Allocation Order M-300 Schedule 62, 11/2/1944, Fed. Reg. 13042, 11/3/1944; General Allocation Order M-300, Schedule 62, Amended 3/5/1946, USNPR0000343; and WPB General Allocation Order 62, Amended 5/16/1945, USNPR0012406-07.

uncertainties of transportation in wartime the restrictions upon the disposition of such materials hereinafter set forth are necessary to prevent dispersion of such materials and to direct the distribution thereof in such manner as to satisfy war and essential civilian needs.¹⁶⁵

The OPM listed thirteen minerals in M-63 including chromium, copper, lead, and zinc. Once the order became effective it forbid any,

[p]erson, other than Metals Reserve Company and any other United States governmental department, agency or corporation, or any agent acting for such Company, department, agency or corporation, shall, *without the written authorization* of the [OPM] Director of Priorities, make any contract or other arrangement for the importing of any Strategic Material.¹⁶⁶ [emphasis added]

By only allowing the MRC to purchase and import the thirteen critical materials, the OPM was maximizing the amounts of those materials that could be stockpiled and ultimately used for wartime production. Yet, NPREC continued the private importation of chromium—with WPB permission—into 1943.

As underscored in the discussion of M-18 and M-300 orders, chromium shortages continued throughout the war. To further address those shortages in January 1944, the WPB issued Allocation Order M-370 that further regulated the distribution and use of chrome pigments. Under M-370, deliveries of chrome pigments, and the acceptance of the chrome pigment deliveries, could not occur without WPB permission.¹⁶⁷

V. America at War

A. Additional Statutory and Executive Order Authority

1. The First War Powers Act

With the nation at war, Congress took steps to streamline and make government operations more efficient, including wartime procurement. On December 18, 1941, Congress passed the First War Powers Act.¹⁶⁸ The act gave the president authority to redistribute functions

¹⁶⁵ General Imports Order – M-63, 12/27/1941, USNPR0005930-32.

¹⁶⁶ General Imports Order – M-63, 12/27/1941, USNPR0005930-32.

¹⁶⁷ WPB, Allocation Order M-370, 1/21/1944, USNPR0005941-43.

¹⁶⁸ 55 Stat. 838, 12/18/1941, USNPR0005569-71 at USNPR0005570.

among executive agencies “only in matters relating to the conduct of the present war.” Regarding government contracting, the First War Powers Act further authorized the President,

for the protection of the interests of the Government, to enter into contracts and into amendments or modifications of contracts heretofore or hereafter made and to advance, progress and other payments thereon, without regard to the provisions of the law relating to the making, performance, amendment, or modification of contracts whenever he deems such action would facilitate prosecution of the war.¹⁶⁹

Thus, among other things, government contracts could be entered into without competitive bidding, and could be extended without renegotiation or modification.

With one exception, a Treasury Department contract that ran from April to August 1943, no documents have been found to indicate that NPRC entered into any contracts with an agency of the United States on which the provisions of the First War Powers Act may have had any bearing.¹⁷⁰ In addition, this Act did not pertain to the regulation of the economy and distribution and use of scarce commodities. While PPG has cited the First War Powers Act as evidence that the “chrome and sodium bichromate chemical industry was subject to . . . Governmental and regulatory control during World War I and II,” it did not exist during World War I, and was not a regulatory measure during World War II.¹⁷¹

2. The War Production Board

The creation of the SPAB in August 1941 did little to improve production and the economy continued to flounder into the winter of 1941-1942. The overlapping of authority between the SPAB, the OPM, the ANMB, and NDAC exacerbated the situation.

Therefore, on January 16, 1942, Roosevelt created the War Production Board (WPB) in Executive Order 9024, and the WPB became the primary federal agency responsible for ensuring that the American economy mobilized for war and produced what was necessary for the United

¹⁶⁹ 55 Stat. 838, 12/18/1941, USNPR0005569-71 at USNPR0005570.

¹⁷⁰ Civilian Price Administration, *Alphabetic Listing of Major War Supply Contracts*, Cumulative, June 1940 through September 1945, volume 3, K-Rex (U.S. Civilian Production Administration, Industrial Statistics Division, circa. 1946), pp. 2235-36

¹⁷¹ For example PPG stated, “Shortly thereafter the Government enacted the First War Powers Act of 1941 and subsequently, the Second War Powers Act of 1942, 56 Stat. 176 (1942) for the purpose of controlling production of materials in the United States during World War II. . . . The chrome and sodium bichromate chemical industry was subject to such Governmental and regulatory control during World War I and II.” PPG Industries, Inc. vs. United States of America, United States Department of Commerce, Penny Pritzler, Secretary of Commerce, In Her Official Capacity, and United States Department of Defense, Civil Action No. 2-12-cv-03526 (KM)(MAH), PPG Industries, Inc.’s Objections and Responses to the United States’ Second Set of Interrogatories, p. 9.

States and its allies to succeed in battle. The WPB assumed the functions of the NDAC, the ANMB, OPM and the SPAB.¹⁷² The WPB's primary objective was the highest and best use of all scarce raw and semi-raw materials—and finished products—for wartime production. In August 1942, the WPB published "Priorities and Industry," that discussed how the WPB operated. The first sentence of the document read, "[t]he Priorities System is the primary method of controlling the flow of materials and finished products in the war economy."¹⁷³ The document continued,

One of the basic ways used were the so-called priority rating or preference rating... These ratings, expressed in a continuous series from AAA to B-8, indicate the relative importance of various USES of materials in the war economy. An order which has been assigned an AAA rating is of the utmost urgency, followed in importance by those in the AA series, the A-I series and ratings of A2, A3, A4, etc. This pattern of ratings is established with the full force of law by Priorities Regulations No. 1, which says that any purchase order bearing a preference rating must be accepted and given its proper place in production and delivery schedules. The preference rating, in other words, is the tag on a purchase order which governs the place that order will take in the war economy.¹⁷⁴

In essence, the WPB's "control over the flow of commodities" in the economy to meet war objectives and meet essential civilian needs was accomplished through conservation and restrictions on the permitted uses of scarce materials through various kinds of orders, including the "M" orders discussed earlier in this report.¹⁷⁵

Although created in January 1942, the WPB—and other government agencies—struggled in their attempts to increase war production through most of 1942. That began to change in late 1942 and into 1943 due in part a reorganization of WPB. Several new vice chairperson positions were created with the two most important being the Program Vice Chairman and the Operations Vice Chairman. The Program Vice Chairman's responsibilities included,

1. Review and approve proposed military, foreign, and civilian programs to ensure that approved programs do not conflict and are consistent with maximum productive possibilities . . .
2. Identify limitations in the supply of resources that restrict the scope of the total production program . . .

¹⁷² Executive Order 9024, 1/16/1942.

¹⁷³ WPB, "Priorities and Industry," 8/1942, PPGNPR0963143-6 at PPGNPR0963145.

¹⁷⁴ WPB, "Priorities and Industry," 8/1942, PPGNPR0963143-6 at PPGNPR0963145.

¹⁷⁵ WPB, *United States War Production Board, Review of 1942 and Prospects for 1943*, 1943, PPGNPR0559836-67 at PPGNPR0559855.

3. Formulate and determine policies, plans, and general methods for the allocation, distribution, and redistribution of resources, for the scheduling of the production and delivery of products, and for the control of inventories . . .
4. Review and approve or disapprove all regulations, and limitations, conservation, preference ratings, and like orders issued under the priorities statute; and provide for deciding appeals from such orders.
5. Require reports from operating officials on the effectuation of program determinations . . .
6. Serve as principal point of contact in the relations of WPB with the Lend-Lease Administration, Board of Economic Warfare, Office of Defense Transportation, the Solid Fuels Coordinator, the Petroleum Administrator for War, and the Department of Agriculture.¹⁷⁶

The Operations Vice Chairmen was responsible for nearly thirty WPB industry committees, although not the key steel, magnesium, and copper committees.¹⁷⁷ Although on paper the Program and Operation Vice Chairmen were of equal power in actuality the Program Vice Chairman had the more significant role within the WPB. When the WPB's reorganization became effective the country's economy functioned as never before supplying the American military, and many of the needs of the nation's allies, with the necessary products to win World War II.

The WPB thus set broad industrial policy to ensure that those engaged in military production received the necessary materials. Although the WPB established allocation criteria, the agency did not design products, own plants, or engage in procurement. In fact, the WPB relied on the cooperation of American business and industry in fulfilling its wartime mission.¹⁷⁸ Cooperation between private enterprise that provided the much needed expertise and knowledge,

¹⁷⁶ *Industrial Mobilization for War, History of the War Production Board and Predecessor Agencies, 1940-1945* (Washington, D.C., 1947; rpt. New York: Greenwood Press, 1969), pp. 582-84.

¹⁷⁷ *Industrial Mobilization for War, History of the War Production Board and Predecessor Agencies, 1940-1945* (Washington, D.C., 1947; rpt. New York: Greenwood Press, 1969), pp. 582-84.

¹⁷⁸ See A. Winkler, *Home Front U.S.A., America during World War II*, 2nd ed. (Wheeling, IL: Harlan Davidson, 2000); Smith, *United States Army in World War II*; and Koistinen, *Arsenal of World War II*, for further discussion on the role and importance of the WPB during World War II and the role of business and industry. Also see *Industrial Mobilization for War, History of the War Production Board and Predecessor Agencies, 1940-1945* (Washington, D.C., 1947; rpt. New York: Greenwood Press, 1969); R. Connery, *The Navy and the Industrial Mobilization in World War II* (Princeton, NJ: Princeton University Press, 1951); and D. Kennedy, *Freedom From Fear, The American People in Depression and War, 1929-1945* (New York: Oxford University Press, 1999), especially Chapter Eighteen, "The War of Machines." For a first-hand account of WPB activities during WWII, see the Love Canal litigation testimony of Lincoln Gordon, who worked for NDAC and later was WPB Program Vice Chairman. *United States of America, The State of New York and UDC-Love Canal v. Hooker Chemicals & Plastics, Corp., et al.*, CIV 79-990, (U.S. District Court, W.D. New York, 1991).

and the federal government that provided the financial capital for plant expansion and a market for war production, characterized the American economy during World War II. The establishment of Industry Advisory Committees (IACs) furthered government-industry cooperation. First formed in 1940 under NDAC, the IACs continued under OPM and the WPB. The IACs gave business and industry a voice in economic planning for the war and IACs existed for most major industries. WPB documents repeatedly stated:

Industry Advisory Committees are representative groups formed for the purpose of furnishing advice and information to the War Production Board on matters furthering the war effort. No actions are taken or decisions made in these meetings, as they are solely for advisory purposes.¹⁷⁹

As early as June 6, 1941, individuals representing the chromium industry met with government officials. Three days later, Henry Goman attended a chromium priorities conference meeting, as he did again on July 16, 1941.¹⁸⁰ From these early meetings developed the Primary Chromium Chemical Producers Industry Advisory Committee (PCCPAAC), which represented manufacturers of sodium bichromate and afforded the means by which they provided information, and their opinions and expertise throughout the War. All five companies engaged in sodium bichromate production had a company representative on the PCCPAAC.¹⁸¹ The committee met at least twelve times from October 1942 through April 23, 1945 with a representative of Natural Products usually in attendance.¹⁸²

One of the WPB's many components was its Chemicals Division, also called the Chemicals Bureau. As of December 1941, the OPM Chemicals Branch had under its supervision 276 chemicals, not including rubber chemicals. Employment in the chemicals and allied products industry rose from 280,000 in 1939 to 715,000 by 1943, and manpower shortages resulted in part from the military draft and higher pay in aircraft and shipbuilding industries.¹⁸³ Chemical production increased twenty-three percent from 1942 to 1943, yet economic growth meant some chemicals were in short supply. By 1944, the 3,000 chemicals were part of WPB

¹⁷⁹ Primary Chromium Chemicals Meeting, 1/22/1945, USNPR0000455-6 at USNPR0000455. Also see, Koistinen, *Arsenal of World War II*, pp. 29-30, 87-94, 200-203.

¹⁸⁰ Minutes, Chromium Priorities Conference, 6/6/1941, PPGNPR0610965-67; Minutes, Chromium Priorities Conference, 6/9/1941, PPGNPR0610963-64; and Minutes, Chromium Priorities Conference, 7/16/1941, PPGNPR0610960.

¹⁸¹ Primary Chromium Chemicals Meeting, 1/22/1945, USNPR0000455-6 at USNPR0000455.

¹⁸² Wizeman to Whitman and Curtis, Inorganics Branch, Industry Advisory Committee Meetings Held and Scheduled Meetings, 8/4/1945, USNPR0005870. This document states that the last meeting was held on January 22, 1945, however the last meeting was April 23, 1945. See note 191 for a listing of dates and of meetings and cited documents.

¹⁸³ J. Krug, *Production, Wartime Achievements and the Reconversion Outlook, A Report to the War Production Board*, 10/9/1945, USNPR0003118-3309 at USNPR0003210-11.

programs with ninety-seven chemicals under some type of WPB order to control their distribution.¹⁸⁴

A 1943 WPB document stated that the overall functions of the division were “first, to control the distribution of chemicals to other industries, and second, to assist the chemical industry to obtain the necessary supplies of chemicals and metals which the industry needs to operate.” The document further noted that a “large part of the output is distributed to other producers and other chemical producers for further processing prior to going to ultimate consuming industries of a different sort.”¹⁸⁵ As of January 1943, the Chemical Division had almost 600 employees. Industries under the jurisdiction of the Chemicals Division had sold nearly \$7.5 billion worth of products in 1942.¹⁸⁶ For example, during a July 1941 meeting and at other meetings in 1941 between OPM personnel and representatives of the three parts of the chrome industry—metallurgical, refractories, and chemicals—the chemicals companies represented were NPRC, Martin Dennis, Imperial Paper & Color Co., Prior Chemical Co. (Diamond Alkali), and Mutual Chemical Co. Discussions at these meetings led to the formation of three informal industry advisory subcommittees to obtain advice from industry on proposed Government actions such as the new priorities system, and on matters such as conservation, substitutes for chromium, allocation of reduced and inadequate supplies, and the kinds of industry and company information to be provided to the Government.¹⁸⁷

With the entry of the United States into the War and the formation of the WPB, the Board’s Director of the Division of Industry Advisory Committees stated that there were then some 400 such committees and that many of them met every month. They were “formed at the request of the chief of the industry branch involved to obtain the advice and cooperation of industry in connection with the War Program.”¹⁸⁸ These meetings were given legal protection from antitrust law prosecution provided that they confined themselves to collecting information and making recommendations, and avoided trying to make policy for an industry or reach any agreement or understanding among themselves regarding action to be taken by the industry. Government policy stated that the Board “need[ed] the help and criticism of [Industry Advisory]

¹⁸⁴ *Industrial Mobilization for War, History of the War Production Board and Predecessor Agencies, 1940-1945* (Washington, D.C., 1947; rpt. New York: Greenwood Press, 1969), pp. 696-97.

¹⁸⁵ WPB, Justification of Number of Employees, Chemicals Division, 1/25/1943, USNPR0013594-97 at USNPR0013594.

¹⁸⁶ WPB, Justification of Number of Employees, Chemicals Division, 1/25/1943, USNPR0013594-97 at USNPR0013594.

¹⁸⁷ Minutes of Meeting of Chrome Industry, 7/16/1941, PPGNPR0000907-11 at PPGNPR0000907. Also see, D. Van Deusen to C. Holmquist, 8/22/1941, PPGNPR0610957; J. Galbraith to Henderson et al., 8/18/1941, PPGNPR0610958; D. Wallace to J. Galbraith, 8/19/1941, PPGNPR0610959; and A. Leith to P. Reed, 12/12/1941, PPGNPR0610947-49.

¹⁸⁸ T. Shore to Members of Industry Advisory Committees, n.d., USNPR0006099-700.

committees” but that the committees were advisory only with all decisions made by the Government.¹⁸⁹

As was often stated in WPB documents, the “purpose of an Industry Advisory Committee is to secure for the War Production Board advice and information and to give industry a voice in the management of the war effort.” It became the “responsibility of each Industry Division Director to see that these group contacts with industry are maintained and properly used. Members of a committee are top executives carefully selected to form a representative cross-section of the industry and should be consulted on all matters of broad policy affecting an industry.”¹⁹⁰

In October 1942, the WPB convened the first meeting of the Primary Chromium Chemical Producers Industry Advisory Committee for the purpose of considering any further steps to take to reduce chrome ore consumption in the chemical industry, and to determine whether there were any remaining non-essential uses that could be eliminated. The committee members were Mutual, Imperial, NPRC, Martin Dennis, and Diamond Alkali, all of the producers of primary chromium chemicals known to the Board.¹⁹¹

During the remainder of the War, WPB personnel often sought the advice and assistance of Committee members regarding “possible methods of increasing production in order to relieve the shortage of primary chromium chemicals required for military and essential civilian uses,” industry manpower shortages, prices for ore and chemical products, the need for and methods of allocation of inadequate supplies of manufactured chemicals among competing uses, and ore usage and supplies.¹⁹² At the August 1943 Committee meeting, for example, it “was generally

¹⁸⁹ T. Shore to Members of Industry Advisory Committees, n.d., USNPR0006099-700.

¹⁹⁰ J. Whitridge to J. Gregg, 9/7/1943, USNPR000941-42.

¹⁹¹ J. Wizeman to T. Shore, 9/23/1942, USNPR0006123-24. Also see, AGENDA, Primary Chromium Chemical Producers Industry Advisory Committee Meeting, 10/7/1942, USNPR0006125; SUMMARY, Primary Chromium Chemical Producers Industry Advisory Committee Meeting, 10/7/1942, USNPR0006126-28; and T. Nichols to A. Leith, 10/2/1942, PPGNPR0027961-63.

¹⁹² WPB, SUMMARY, Primary Chromium Chemical Producers Industry Advisory Committee, 5/19/1943, USNPR0006086-90; WPB, Summary, Primary Chromium Chemical Producers Industry Advisory Committee, 7/6/1943, USNPR0006101-05; WPB, Summary, Primary Chromium Chemical Producers Industry Advisory Committee, 8/3/1943, USNPR0006106-12; WPB, Summary, Primary Chromium Chemical Producers Industry Advisory Committee, 11/11/1943, USNPR0006113-22; WPB, Summary, Primary Chromium Chemical Producers Industry Advisory Committee, 5/19/1943, USNPR0006059-66; Primary Chromium Chemical Producers Industry Advisory Committee, 2/9/1944, PPGNPR0008745-51; WPB, Primary Chromium Chemical Producers Industry Advisory Committee, 5/10/1944, USNPR0006068-72; WPB, Primary Chromium Chemical Producers Industry Advisory Committee, 7/26/1944, USNPR0006073-78; WPB, Primary Chromium Chemical Producers Industry Advisory Committee, 9/19/1944, USNPR0006079-84; WPB, Primary Chromium Chemical Producers Industry Advisory Committee, 1/22/1945, USNPR0000455-62; WPB, Primary Chromium Chemical Producers Industry Advisory Committee, 4/23/1945, USNPR0000446-50; and WPB, verbatim transcript, Chemical Bureau Requirements Committee, 1/22/1945, PPGNPR0008863-90.

agreed that the loss of experienced workers and the inability to obtain competent replacements are primarily responsible for the industry's failure to meet production goals.” Another principal topic discussed was the proposed allocation order, completely revising Order M-18-b.¹⁹³

The Primary Chromium Chemical Producers committee was one of approximately 85 committees of the WPB Chemicals Division alone.¹⁹⁴

3. The Second War Powers Act

Three months after it passed the First War Powers Act, Congress passed the Second War Powers Act in March 1942. The Second War Powers Act gave the government extensive authority to regulate the wartime economy including the provision that “[d]eliveries of material” under all orders placed pursuant to the Act by the Navy and the Army “shall, in the discretion of the President, take priority over all deliveries for private account or for export.”¹⁹⁵ The Act further stated that, “the President may require acceptance of and performance under such contracts or orders in preference to other contracts or orders for the purpose of assuring such priority.” Moreover, when the President concluded “that the fulfillment of requirements for the defense of the United States will result in a shortage in the supply of any material or of any facilities for defense or for private account or for export, the President may allocate such material or facilities in such manner, upon such conditions and to such extent as he shall deem necessary or appropriate in the public interest and to promote the national defense.”¹⁹⁶ In order to implement these powers, the Act also authorized certain record-keeping requirements, investigations, oaths, sworn testimony, and inspection and production of books and records as necessary to enforce and administer these provisions.¹⁹⁷

No documents have been found indicating that the federal Government issued any delivery orders to NPRC pursuant to the Second War Powers Act, or issued directions to NPRC requiring its acceptance of and performance under contracts or orders in preference to contracts or orders for private account or for export. However, for much of the war, NPRC and the rest of American industry, was subject to the allocation provisions of the Act. Nevertheless, the available documents do not show any increase in NPRC’s production volume of sodium bichromate as a result of the Government’s implementation of the Act’s provisions.

¹⁹³ WPB, SUMMARY, Primary Chromium Chemical Producers Industry Advisory Committee, 8/3/1943, USNPR0006106-12.

¹⁹⁴ WPB, Chemical Bureau, Industry Advisory Committees, USNPR0006648-49.

¹⁹⁵ 56 Stat. 176, 3/27/1942, USNPR0008873-8 at USNPR0008875.

¹⁹⁶ 56 Stat., 176-87, USNPR0008873-8 at USNPR0008875.

¹⁹⁷ 56 Stat. 176, 3/27/1942, USNPR0008873-8 at USNPR0008876-77.

4. Labor Regulations and Policies during World War II

In January 1942, shortly after the United States entered the war, President Roosevelt issued Executive Order 9017, which emphasized that the “national interest demands that there shall be no interruption of any work which contributes to the effective prosecution of the war,” and that at a December 1941 “conference of representatives of labor and industry which met at the call of the President” it had been “agreed that for the duration of the war there shall be no strikes or lock-outs, and that all labor disputes shall be settled by peaceful means, and that a National War Labor Board be established for the peaceful adjustment of such disputes.” The Order provided for a twelve-member board, four representatives each from the public, from employees, and from employers.¹⁹⁸

On April 18, 1942 Executive Order 9139 created the War Manpower Commission (WMC), whose functions included the formulation of “plans and programs and establish basic national policies to assure the most effective mobilization and maximum utilization of the Nation's manpower in the prosecution of the war; and issue such policy and operating directives as may be necessary,” “[e]stimate the requirements of manpower for industry; review all other estimates of needs for military, agricultural, and civilian manpower; and direct the several departments and agencies of the Government as to the proper allocation of available manpower,” “[e]stablish policies and prescribe regulations governing all Federal programs relating to the recruitment, vocational training, and placement of workers to meet the needs of industry and agriculture,” and “[p]rescribe basic policies governing the filling of the Federal Government's requirements for manpower, excluding those of the military and naval forces, and issue such operating directives as may be necessary.”¹⁹⁹ Two other 1942 executive orders transferred the United States Employment Service and the Selective Service System to the WMC.²⁰⁰

As stated in the February 1943 WMC Manual of Operations, the purposes of the stabilization of employment through hiring controls in areas of manpower shortage were: “(a) the elimination of wasteful labor turnover in essential activities; (b) the reduction of unnecessary migration by encouraging the use of local labor; (c) the direction of the flow of scarce labor to employers engaged in essential activities in preference to other employers; [and] (d) the maximum utilization of manpower resources.”²⁰¹

Contrary to PPG's allegations in this case, I have found no evidence in either the documents relating to this industry or the historical literature regarding World War II that any

¹⁹⁸ Executive Order 9017, 1/12/1942, USNPR0006801-04 at USNPR0006801.

¹⁹⁹ Executive Order 9017, 4/18/1942, USNPR0006805-08 at USNPR0006805.

²⁰⁰ Executive Order 9247, 9/17/1942, USNPR0006820-21; and Executive Order 9279, 12/5/1942, USNPR0000803-05.

²⁰¹ WMC, Manual of Operations, 2/1/1943, USNPR000814-18 at USNPR000814-15.

agency of the United States ever placed or arranged for the placement, as workers or laborers at the Garfield Avenue plant, American citizens of Japanese descent,²⁰² Jamaican laborers, prisoners of war, or personnel deferred from the draft into or furloughed from the United States Armed Services, during World War II.²⁰³

5. Certificates of Necessity

The Federal Government encouraged private investment in war mobilization by allowing a business to claim an accelerated rate of tax depreciation for tools, equipment, or buildings purchased to manufacture defense materiel. The Second Revenue Act of 1940, which became law in October of that year, allowed businesses to “deduct from gross income 20 percent annually, for a period of five years, of the cost of all facilities created or acquired for national defense.”²⁰⁴ Before a company could claim the deduction, “[e]ach new facility receiving the amortization privilege had to be certified as necessary to national defense. . . . Amortization was applicable only to that portion of a given facility considered to be necessary to defense needs....”²⁰⁵

To receive authority to take the deduction, a manufacturer needed to apply to the government for a “Necessity Certificate” documenting that the facilities listed in the application were necessary to national defense. When doing so, the company had to file a standard application, swear to the application’s truthfulness, and submit an “Appendix A” that listed all land, buildings, or equipment that would be acquired during the accelerated depreciation period.²⁰⁶ By definition, the company would own any buildings, machinery, or equipment listed on a company’s Necessity Certificate application. Obtaining the certificate would allow the business to claim depreciation for tax reasons on the facilities on an accelerated basis. The company, however, would still purchase and own the equipment.

²⁰² Industry and WPB personnel discussed in November 1943 the “possibilities for utilizing” American citizens of Japanese descent who had been relocated from their homes on the West Coast, Primary Chromium Chemical Producers Industry Advisory Committee, 11/11/1943, USNPR0006113-22 at USNPR0006118. There were “a considerable number of American Citizens of Japanese descent who ha[d] been uprooted from their homes on the West Coast and transferred to relocation centers” and a War Relocation Authority had been established “to find employment for Japanese now quartered at nine segregation camps.” As of that time, some 3,000 Japanese had been placed in plants in and around Chicago, and a small number had settled in Cleveland and New York, but no evidence has been located indicating that any were ever placed in Jersey City, New Jersey.

²⁰³ In April and June 1945, WPB personnel also discussed suggestions were made regarding the use of foreign labor from Jamaica, Honduras, and Barbados; prisoners of war; and wage incentive plans. J. Wizeman to W. Whitman and H. Custis, Inorganics Branch Progress Report, 4/21/1943, USNPR0005773-74 at USNPR0005774; WPB, Primary Chromium Chemical Producers Industry Advisory Committee, 4/23/1945, USNPR0000446-50 at USNPR0000449-50; Chemicals Bureau Progress Report for Week of 4/21/1945, PPGNPR0003284-85; Chemicals Bureau Progress Report for Week of 6/2/1945, PPGNPR0000011-18. Nothing has been found to indicate that anything came of these discussions.

²⁰⁴ 54 Stat. 974, 10/8/1940; and Smith, *United States Army in World War II*, p. 459. Under the law, a business could initially request accelerated depreciation for purchases dating from 6/10/1940. In October 1941, Congress changed the date to January 1, 1940.

²⁰⁵ Smith, *United States Army in World War II*, p. 460.

²⁰⁶ Smith, *United States Army in World War II*, pp. 461-62.

The Necessity Certificate program was successful in encouraging private investment in facilities. Under most circumstances, a company would have completely amortized the cost of the new facilities in five years. Overall, during World War II, the Army and Navy issued approximately 39,000 certificates and the WPB issued approximately 4,000 certificates. The estimated value of all Necessity Certificates issued during World War II was \$7.3 billion.²⁰⁷

I have seen no documentation showing that Natural Products sought, obtained, or otherwise participated in the Necessity Certificate program.

B. Continued Shortages of Chromate Chemicals and Proposals for Increased Production

As discussed, by the fall of 1943, as aircraft production increased, shortages of chromic acid grew worse. The shortage would continue through the end of the war. Later in the war a member of the Chemical Task Group noted that chromic acid was used for “anodizing of aluminum sheets” and “[p]ractically every piece of aluminum we use in aircraft manufacturing has to be treated with zinc chromate primarily.”²⁰⁸ Chemicals made by NPRC and the other bichromate manufacturers were used in the production of chromic acid, zinc chromate, and other derivative chemicals.²⁰⁹ Government efforts therefore focused on the “possibility of getting some extra manpower to help along the situation” in the bichromate plants. What then followed was a discussion and presentation of the labor shortage at the six plants, as reported by each company that manufactured sodium bichromate including the Natural Products plant in Jersey City, NJ. Natural Products reported that it employed 116 people and it needed 18 more laborers and 6 more mechanic’s helpers. If such additional workers could be hired the company believed it could manufacture 200,000 additional pounds per month, although the board thought 100,000 additional pounds a better estimate. Since June 1944, employment at all six plants had declined by a total of 102 employees. Natural Products had 24 fewer employees.²¹⁰

Finding an adequate number of workers was an economic problem throughout World War II, a problem that grew worse as the years passed. WPB Chairman Donald Nelson may have summarized it best: “[w]hat we had was a series of acutely localized manpower shortages, in some city, or in some industry; shortages of skilled workers of certain trades—but never an

²⁰⁷ House Report No. 504, 82d Congress, 1st Session, Certificates of Necessity and Government Plant Expansion Loans, 5/28/1951 at p. 22. Evidently referring to a Korean War program that had issued \$5 billion in Necessity Certificates in the first five months of the war the report began, “[t]he certificate of necessity program is the biggest bonanza that ever came down the Government pike.” See *ibid*, p. 1.

²⁰⁸ Chemical Task Group, “Transcript of Meeting,” 4/20/1945, PPGNPR0028119-45 at PPGNPR0028123-24.

²⁰⁹ Healey, 9/7/1945, “History of Chrome Chemicals,” PPGNPR0008669-94.

²¹⁰ Chemical Task Group, “Transcript of Meeting,” 4/20/1945, PPGNPR0028119-45 at PPGNPR0028123-24.

actual overall-shortage of manpower.”²¹¹ Fifteen million Americans eventually served in the armed forces that drew workers from farms and factories. It was not uncommon for workers to move from industry to industry in search of higher paying or healthier places to work, or both.

On February 7, 1944 members of the WPB’s Chemical Bureau Inorganic Section met to discuss the growing shortage of chromate chemicals. The summary of the meeting read, in part,

[a] shortage of chromate is developing which will be acute for the next half year. The difficulty is aggravated labor shortage in an industry that is not healthful and where labor at any time is hard to get, and by increased costs.²¹²

Labor shortages plagued the sodium bichromate industry through the end of the war. The Government was never able to solve this problem, and the manufacturers apparently chose not to do so by addressing the poor working conditions in their plants.²¹³ Even as of late July 1945, the WPB concluded that the six plants of the five manufacturers needed an additional 142 workers with Natural Products needing twenty-four.²¹⁴

In the late winter and into the summer of 1944, the WPB considered three ideas to address the chromates shortage: one, have the companies run the same ore fewer times resulting in a higher output of sodium bichromate since each successive run of the same ore yielded less material for producing sodium bichromate; two, run higher grade Russian ore; or three, expand plant capacity. Each “solution” had its own set of problems. Running ore fewer times would produce a sludge that would result in potential disposal problems. Using higher grade and more expensive Russian ore would require that the government subsidize its use. Although the government did have Mutual start converting a DPC-owned plant in Lake Charles, Louisiana, Mutual did not complete that work before the war ended. Additionally, the industry opposed such expansion, which it feared would increase production capacity and supply, and thereby lower prices and industry profits after the war.

At the February 7, 1944, meeting of the WPB Chemicals Bureau Inorganic Section it was suggested that,

[t]he best way to increase output appears to be to run more ore thru the plants at a reduced recovery. Ordinarily recovery is 85% it might drop to 60%, but would leave a

²¹¹ D. Nelson, *Arsenal of Democracy, The Story of American War Production* (New York: Harcourt, Brace and Company, 1946), p. 403 as quoted in Klein, *A Call to Arms*, p. 542.

²¹² H. Neal, Meeting of Chemicals Bureau, Inorganic Section, WPB, 2/7/1944, PPGNPR0001881-82.

²¹³ See pages 20, 34-35, and 63-64 of this report.

²¹⁴ M. Preston to J. Gould, 7/20/1945, USNPR0011096-97.

probably marketable sludge which under usual conditions is retreated. Under the proposed scheme it would be stockpiled for the present. Thus 40% to 50% more output could be recovered.²¹⁵

Two days later at a Primary Chromium Chemical Producers Committee meeting, a Mr. Ford of the WPB's ferro alloys branch suggested that chromite output be increased by reducing the ore runs and having the MRC "purchase the sludge at a price sufficiently high to compensate for the increased consumption of ore."²¹⁶ Natural Products Refining Company had reported that it probably could increase bichromate production "by wasteful use of chromite ore...but ore losses would have to be subsidized."²¹⁷ As of February 1944, the WPB thought it "might be possible to take the sludge, sell it and get sufficient revenue to make up for the uneconomic, wasteful practice and utilize the sludge for an end product having a commercial outlet." They suggested that "[y]ou could stockpile the sludge at the plant and when the war is over stop buying on some definite schedule. It may have some resale value."²¹⁸ Other WPB documents in March 1944 discussed this as a proposed plan, but not as one that was adopted or implemented.²¹⁹

On April 8, 1944, L. Boulware, WPB Operations Vice Chairman, wrote to Jessie Jones, Secretary of Commerce and head of the RFC. Boulware noted that the Office of Price Administration opposed raising the ceiling price of chrome chemicals. Boulware briefly outlined the sludge purchase proposal and then "requested that instructions be given to an appropriate Reconstruction Finance Corporation subsidiary to carry out this program which is essential to the war effort."²²⁰ Jones notified the WPB Chairman Donald Nelson that he was sending the matter to the MRC for their consideration.²²¹

The MRC within a few days formally rejected the sludge purchase plan. On April 12, 1944, Jones wrote Nelson and told him that MRC could not make the purchases and that the suggested "program" "clearly [fell] outside" the MRC's "sphere of activities." The "plan for the purchase of a sludge containing [chromium] from one producer of chrome chemicals falls

²¹⁵ H. Neal, Meeting of Chemicals Bureau, Inorganic Section, WPB, 2/7/1944, PPGNPR0001881-82. A 2/10/44 handwritten note at the bottom of the second page stated that the WPB had been advised "that above procedure on part of MRC is believed to be impracticable" and for an MRC representative to so advise a WPB representative.

²¹⁶ Primary Chromium Chemicals Meeting, 2/9/1944, PPGNPR0008745-51 at PPCNPR0008748.

²¹⁷ T. Keeling, "Memorandum for the Chief, Materials Branch, Production Division, Headquarters, Army Service Forces," 2/18/1944, PPGNPR0027799-806 at PPGNPR0027803. Also see, M. Perlow and W. Healey to J. Wizeman, 3/1/1944, PPGNPR0008726.

²¹⁸ Primary Chromium Chemical Producers Industry Advisory Committee, 2/9/1944, PPGNPR0008745-51.

²¹⁹ M. Perlow and W. Healey to J. Wizeman, 3/1/1944, PPGNPR0008726-30; H. Healey and M. Perlow to J. Cooper and J. Wizeman, 3/7/1944, PPGNPR0012719-22; G. Hamill to R. Fischolis, 3/28/44, PPGNPR0008648-55.

²²⁰ L. Boulware to the Secretary of Commerce, 4/8/1944, PPGNPR0001893-95 at PPGNPR0001894.

²²¹ J. Jones to D. Nelson, 4/8/1944, PPGNPR0001893.

outside the present scope of the MRC program. This matter was informally discussed with Metals Reserve by representatives of the War Production Board some time ago and the Chemicals Division was then informed that Metals Reserve Company is without authority to buy products of this type.”²²² No documentation shows that MRC ever purchased such sludges from NPRC, or that any agency of the Government ever owned any such waste materials.²²³

In his April 8, 1944 letter, Boulware had proposed purchasing the sludge from running “high grade metallurgical chrome ore.”²²⁴ Although the MRC rejected sludge purchase, the idea of using higher grade ore persisted. On May 9, 1944, Nelson wrote Jones and asked him to consider if the MRC, which at that time owned higher grade Russian chrome ore, or another RFC subsidiary could sell the Russian ore to the producers of sodium bichromate at a price that would allow them to operate within the current price structure. In his May 9 letter, Nelson did not mention sludge purchases.²²⁵ Jones responded favorably to Nelson’s request and on May 26, 1944, wrote H. A. Mulligan, President of the DSC, asking the DSC to put a program into place to subsidize purchases of high grade ore. Urgent war needs made the purchases necessary. President Roosevelt signed off on the request. Metals Reserve Corporation Vice President Samuel Sabin outlined the program to the MRC directors and noted the program would run through October 31, 1944, and the cost would not exceed \$1,000,000.²²⁶

On June 2, 1944, Sabin wrote Goman of Natural Products to make him aware of the subsidy plan. Sabin said the DSC would reimburse producers of sodium bichromate “for unusual costs from the use of high grade chrome ore in the production of sodium bichromate” between June and October 1944.²²⁷ S. Stanton of Natural Products responded to Sabin on June 8, 1944, and said, “[w]e have no high grade ore on hand at the present time, nor do we anticipate the purchase of any unless we are compelled to do so on account of a shortage of lower grade ore.”²²⁸ However, there is no documentation to show that Natural Products participated in the subsidy program. On June 20, 1945, Nathaniel Royall, the chief auditor of the MRC wrote to

²²² Jones to Nelson, 4/12/1944, PPGNPR0962811-16 at PPGNPR0962811-12. More legible duplicate at USNPR001732-33.

²²³ WPB, Chemicals Bureau Progress Report, 4/26/1944, PPGNPR0015668-70 at PPGNPR001569-70; Nelson to Jones, 5/9/1944, USNPR0001752-53.

²²⁴ L. Boulware to the Secretary of Commerce, 4/8/1944, PPGNPR0001893-95 at PPGNPR0001894.

²²⁵ Nelson to Jones, 5/9/1944, PPGNPR0962811-16 at PPGNPR0962816.

²²⁶ S. Sabin, “Memorandum for Directors,” 5/27/1944, PPGNPR0015951; and Jones to H. Mulligan, 6/26/1944, PPGNPR0015954.

²²⁷ Sabin to H. Goman, 6/2/1944, PPGNPR0015463. Sabin sent the same letter to other sodium bichromate producers: see, Sabin to C. Marlett (Martin Dennis), 5/31/1944, PPGNPR0015947; Sabin to A. Brown (Imperial), 5/31/1944, PPGNPR0015464; Sabin to R. Evans (Diamond Alkali), 5/31/1944, PPGNPR0015464; and Sabin to G. Bennington (Mutual), 5/31/1944, PPGNPR0015466.

²²⁸ Stanton to Sabin, 6/8/1944, PPGNPR0015460.

Sabin. The auditor recounted that in the previous June, Sabin requested that the MRC's auditing division "audit the records of those producers of sodium bichromate who were entitled to subsidy payments because of the use of high grade chrome ore in the process." Four companies—Diamond Alkali, Imperial Paper & Color, Martin Dennis, and Mutual Chemical—all had participated in the program. The four companies had purchased almost 31 million "net dry pounds" at a cost of \$758,770.64. Royall did not mention Natural Products Refining Company in his memorandum.²²⁹

The third means of expanding sodium bichromate production was through additional plant capacity. The chrome chemical industry, however, opposed such expansion "for competitive reasons."²³⁰ At a Primary Chromium Chemicals Producers meeting in January 1945, some industry leaders thought adding additional workers would suffice to increase production. Although some within the WPB office "appreciated industry's viewpoint," the shortage of sodium bichromate required expansion of production facilities. Because of labor shortages, expansion could not occur in areas where existing plants operated. Instead, the WPB considered using idled defense plants in non-critical areas that could be converted to produce sodium bichromate.²³¹ Ultimately, the government-sponsored conversion of a plant in Lake Charles, Louisiana by Mutual Chemical was not completed as of the end of the war in August 1945, and the project was therefore cancelled.²³²

Although the government later opted to have Mutual Chemical convert the Lake Charles facility, attempts had previously been made to expand production at existing plants, including Natural Products' plant in Jersey City. In May 1944, WPB Operations Vice Chairman wrote to Jesse Jones notifying him that Natural Products had submitted an application for a project to expand production of sodium bichromate by 600,000 pounds per month. The company estimated that it would spend \$75,265.78 on the expansion. Boulware added 10 percent to the project bringing the total to \$82,792.00. He told Jones that the WPB had approved the project and requested that Jones make funding available through the Defense Plant Corporation, noting that "these are emergency facilities for the benefit of the war program."²³³ In early May, the Facilities Committee had approved the project. However, in the summer of 1944, Natural

²²⁹ N. Royall, "Memorandum to Mr. Samuel H. Sabin, Vice President," 6/20/1945, PPGNPR0015476-78.

²³⁰ Primary Chromium Chemicals Meeting, 2/9/1944, PPGNPR0008745-51 at PPGNPR0008746; and W. Healey, 9/7/1945, History of Chrome Chemicals," PPGNPR0008669-94 at PPGNPR0008680.

²³¹ Primary Chromium Chemicals Meeting, 1/22/1945, USNPR0000455-62 at USNPR0000460-61.

²³² D. Morgan to R. Williams, 8/2/1945, PPGNPR0014977-9 at PPGNPR0014978; W. Healey, 9/7/1945, History of Chrome Chemicals," PPGNPR0008669-9 at PPGNPR0008683-84; WPB Chemicals Bureau Requirements Committee Meeting Transcript, 6/25/1945, PPGNPR0008829-51 at PPGNPR0008835-36, PPGNPR0008839-41.

²³³ Boulware to Jones, 5/16/1944, PPGNPR0015740. Also see, S. Anderson to Boulware, 5/30/1944, PPGNPR0962887-89.

Products decided against the DPC-funded expansion and on August 16, 1944, Boulware notified Jones of the company's decision. Jones in turn notified Nelson at the WPB.²³⁴

Natural Products Refining Company did not participate in either of the programs that the WPB put forth during World War II to increase sodium bichromate production: the use of higher grade Russian Ore or federally-financed plant expansion.²³⁵

C. OPA Maximum Price Regulations - Numbers 188, 258 and 575

During World War I, inflation had been rampant when wholesale prices and the cost of living increased by more than 80 percent. As the United States moved to a wartime economy beginning in 1940, policy makers wanted to prevent a repeat of the high inflation during World War I.²³⁶ To that end, on April 11, 1941, President Roosevelt issued Executive Order 8734 that established the Office of Price Administration and Civilian Supply that later became known simply as the Office of Price Administration (OPA).²³⁷ The OPA initially assumed responsibility for price stabilization and consumer protection from the NDAC and the OPM. The OPA continued its work under the WPB and did so throughout World War II.

An OPA outline of the Emergency Price Control Act of January 1942 for staff members stated that Section 205 gave the Administrator wide enforcement powers that included enjoining “an anticipated violation of the Act or a regulation thereunder . . . recommend a criminal prosecution by the Attorney General.” Also, a private individual “compelled to buy at over the price ceiling” could bring a civil action for treble damages. And, the administrator could “require that all sellers of a commodity obtain licenses and . . . [and] in the event of violation of a price schedule or other order, the Administrator” could, after warning the violator, “apply to a court for suspension of the license up to a year.” Such a suspension could prohibit the person from selling a commodity with respect to which he committed a violation, and also from selling other commodities subject to a price schedule. Neither this OPA document nor the statute itself

²³⁴ Boulware to Jones, 8/16/1944, PPGNPR0015738; Morgan to Houston, 10/31/1944, PPGNPR0015921; and Jones to Nelson, 8/16/1944, PPGNPR0015739.

²³⁵ The DPC did fund plant expansion at the Martin Dennis Plant in Kearney, NJ and at the Mutual Chemical plants in Baltimore, MD and Jersey City, NJ through the use of what were called DPC “plancors.” Private money also funded expansion at Mutual’s Baltimore plant and at the Diamond Alkali plant in Painesville, OH. Expansion at Martin Dennis was incomplete when the war ended and the WPB considered all expansion of little value because of ongoing labor shortages. See, Healey, 9/7/1945, History of Chrome Chemicals,” PPGNPR0008669-94 at PPGNPR0008680-81.

²³⁶ Koistinen, *Arsenal of World War II*, pp. 421-32. During World War II, however, wholesale prices rose about 38 percent and the cost of living by around 27 percent (*ibid.*, p. 432).

²³⁷ Executive Order 8875, 4/11/1941, PPGNPR0009646-48 at PPGNPR0009648. Contrary to PPG’s allegation, there was no OPA during World War I.

provided for Government seizure of a manufacturer's plant if the manufacturer sold at prices in excess of those prescribed.²³⁸

In summary, during World War II, the regulation of these and all other regulated prices was a "wartime measure . . . necessary for winning the war." "It is the basic step in the economic mobilization that must accompany physical mobilization of manpower and resources." Corrective action was permitted and would be taken as to individual sellers, however, "to iron out abnormal or especially disadvantageous competitive situations" and inequality and hardship in "particular situations in which, for example, one retailer finds his prices far below the going market." OPA administered not only the stabilization of prices and rents, but also the stabilization of wages and profits. "Those who are inclined to grumble at hardships or inequities arising out of the program must reckon with the alternatives: certain inflation and grave risk of military defeat." This was "more than a mere anti-profiteering measure; it joins consumer, retailer, wholesaler, manufacturer, and Government in a united effort for the protection of all," and the cooperation of "every American" was needed to gain the objectives of "victory over inflation at home and over our enemies abroad."²³⁹

Among other requirements, the November 1942 Maximum Price Regulation No. 258 prescribed maximum prices for all domestic sales of imported chrome ore except "sales or deliveries to the United States or any agency thereof."²⁴⁰ This was "designed to control ore costs of industry and prevent undue pressure from being put on end-product prices."²⁴¹ At the time the regulation was announced the MRC and other governmental agencies had been buying and stockpiling chrome ores, a practice that the MRC continued. Government officials anticipated that the new regulations would "ensure American industry of a supply of chrome ores at prices not in excess of the maximum prices prescribed by this Regulation. At the same time, the fact that the maximum prices prescribed are not applicable to sales to governmental agencies will to enable the Metals Reserve Company to continue to buy imported and domestic ores at such prices as it deems wise under the circumstances."²⁴² MRC sale of such ores, however, would be made "at prices not in excess of those prescribed by this Regulation."²⁴³

²³⁸ H. Reuss to Members of the Consumer's Durable Goods Price Section, 2/6/1942, USNPR0001175-79 at USNPR0001179.

²³⁹ OPA, Price Control Handbook, 7/1/1942, USNPR0001148-74. Quote excerpts are at USNPR0001149.

²⁴⁰ OPA, Part 1405—Ferro-Alloys [MPR 258] Chrome Ores, 11/3/1942; and OPA, Press Release, 11/4/1942, USNPR0000243-5 at USNPR0000244.

²⁴¹ OPA, Statement of Considerations Involved in the Issuance of Maximum Price Regulation No. 258, Chrome Ores, USNPR0000681-93 at USNPR0000686.

²⁴² OPA, Statement of Considerations Involved in the Issuance of Maximum Price Regulation No. 258, Chrome Ores, USNPR0000681-93 at USNPR0000687.

²⁴³ OPA, Statement of Considerations Involved in the Issuance of Maximum Price Regulation No. 258, Chrome Ores, USNPR0000681-93 at USNPR0000686.

OPA's Statement of Considerations Involved in the Issuance of Maximum Price Regulation No. 258, stated that chrome ore, also referred to as chromite, was "principal raw material and a major cost element in the production of ferrochromium, chromium metal, chromium chemicals and chrome refractory products," and that each of those commodities was "subject to price control under the General Maximum Price Regulation or Maximum Price Regulation No. 188."²⁴⁴ The OPA Statement described the "necessity" for Maximum Price Regulation No. 258, noting that the stabilization and control of the price of chrome ore was therefore necessary in order to maintain effective control of the prices of these commodities and, at the same time, to encourage their production in the volume necessary for the war effort."²⁴⁵ OPA concluded based on the data available to it that the maximum prices set by the regulation were "generally fair and equitable and will effectuate the purposes of the Emergency Price Control Act of 1942."²⁴⁶

As with other aspects of the regulation of the economy during World War II, the Government sought the views and information of relevant members of the chromium chemicals manufacturers in September 1942 regarding the proposed schedule of maximum prices on all grades of chrome ore. OPA documents indicate that NPRC did not take advantage of the opportunities to contribute or comment in person or in writing. One government official went so far as to write, "Natural Products Refining Company did not see fit to comment in any way."²⁴⁷

OPA's wartime actions regarding these commodities reflected the information it gathered regarding their manufacture and the companies who made them. For example, a circa March 1943 OPA "Economic Brief on Chromates and Bichromates" described the production process for sodium bichromate, and the uses for chromium chemicals. OPA officials also visited companies manufacturing sodium bichromate to collect cost information. During a visit to NPRC, for example, OPA's review of shipping invoices, representing all sales made for a period of six months indicated defense uses.²⁴⁸ It also included a discussion of the June 1942 criminal indictment of NPRC and the other members of the industry for Sherman Act restraint of trade violations, including price fixing and allocation of markets, throughout the 1930s.²⁴⁹ OPA had

²⁴⁴ OPA, Statement of Considerations Involved in the Issuance of Maximum Price Regulation No. 258, Chrome Ores, USNPR0000681-93 at USNPR0000681.

²⁴⁵ OPA, Statement of Considerations Involved in the Issuance of Maximum Price Regulation No. 258, Chrome Ores, USNPR0000681-93 at USNPR0000684.

²⁴⁶ OPA, Statement of Considerations Involved in the Issuance of Maximum Price Regulation No. 258, Chrome Ores, USNPR0000681-93 at USNPR0000690.

²⁴⁷ R. Phelps to C. Helmquist, 9/19/1942, PPGNPR0560342-43. Also see G. Goldberg to Phelps, 9/14/1942, PPGNPR0610933-34; and Goldberg to Phelps, 9/4/1942, PPGNPR0610936.

²⁴⁸ OPA, Economic Brief on Chromates and Bichromates, circa. 1943, PPGNPP0611607-56 at PPGNPR0611611-16; Goldberg to P. Malin, 2/22/1943, PPGNPR0612290; and Malin to H. Taggart, 2/15/1943, PPGNPR0612254.

²⁴⁹ OPA, Economic Brief on Chromates and Bichromates, circa. 1943, PPGNPP0611607-56 at PPGNPR0611622-23. Nineteen companies were later fined a total of \$142,500 as part of their plea agreement. See, *New York Times*,

also tried but had not been able to obtain from NPRC information regarding NPRC's ratio of chrome ore cost to total cost, the ratio of labor costs to total cost, percent of net income before taxes to net sales for 1941 and 1942, and stated that NPRC was "delinquent" in sending in other required data.²⁵⁰

Although the OPA lacked statutory authority to regulate prices until passage of the Emergency Price Control Act in January 1942, OPA Chairman Leon Henderson nevertheless took steps to keep prices down and inflation in check. After passage of the Emergency Price Control Act, the OPA issued Maximum Price Regulation No. 188 or "General Max" freezing the price on most retail items at their maximum levels as of March 1942, including the price of chrome chemicals and other chromium-based products. Despite the seemingly strong authority granted to the OPA, it functioned inefficiently and the consumer price index increased by 7.6 percent between April 1942 and April 1943.²⁵¹

In October 1944, the OPA adopted a 7.5 percent discount on the price of all chromite concentrates as well as the Transvaal ore used by the chemicals industry. The OPA "expected that this discount will be of considerable assistance to producers of chrome chemicals, particularly the smaller ones."²⁵²

In November 1944, "[s]everal producers of chrome chemicals . . . approached [the OPA] with regard to a general price increase" for their products. As a result, OPA was preparing a questionnaire governing operating costs, profit and loss statement, and the like, for all producers "so that a decision with regard to price action can be made."²⁵³ On February 12, 1945, the OPA issued Maximum Price Regulation 575 that allowed for a price increase of one-half cent per 100 pounds of primary chrome chemicals including sodium bichromate effective February 17, 1945. Prices on products using sodium bichromate, such as chromic acid, were also allowed to rise. In

"19 Acid Producers Are Fined \$142,500," 7/17/1945, PPGNPR0029818; and *New York Times*, "Chemistry Firms Indicted as Trusts," 6/26/1942, PPGNPR0029819.

²⁵⁰ OPA, Economic Brief on Chromates and Bichromates, circa. 1943, PPGNPP0611607-56 at PPGNPR0611632-33 and PPGNPR061136-37. Also see, P. Green to NPRC, 12/20/1943, USNPR0001258-59; Green to NPRC, 2/19/1944, USNPR0001256; and W. Sims to NPRC, 5/25/1944, USNPR0001254.

²⁵¹ Koistinen, *Arsenal of World War II*, 132-35, 420-27; and OPA, Document No. 6535, "Statement of Considerations Involved in the Issuance of Maximum Price Regulation No. 258, Chrome Ores, USNPR0000681-693 at USNPR0000684.

²⁵² J. Wizeman to W. Whitman and H. Custis, Industry Advisory Committee Meetings Held and Scheduled, 10/7/1944, USNPR0005718-19.

²⁵³ J. Wizeman to W. Whitman and H. Custis, Industry Advisory Committee Meetings Held and Scheduled, 11/4/1944, USNPR0005726-27.

doing so, the OPA noted that the increase was the first price change since July 1941 and was necessary because of increases in product costs brought on by higher ore and labor costs.²⁵⁴

D. Sources from which NPRC Bought Chromite

As discussed earlier, Natural Products made numerous purchases of chemical grade chromite from the MRC between June 1943 and February 1946, pursuant to standard form contracts that listed the MRC as the “Seller” and NPRC as the “Buyer.” The contracts stated that NPRC was purchasing “Transvaal Grade B chrome ore” and the amount of ore purchased and provided the terms of shipment and delivery. NPRC signed its first such contract in June 1943 for 2,500 long tons scheduled for delivery in June and July 1943 followed by 2,000 long tons in August. Under terms of the delivery clause, the ore would “be delivered f.o.b. railroad cars at Buyer’s Jersey City, New Jersey Plant.”²⁵⁵ None of the contracts suggest that the MRC retained any ownership rights in the ore that it sold and delivered to the NPRC plant. The MRC made such sales to the other chromates manufacturers using the same form.²⁵⁶

From its founding in 1909 until the middle of 1943, there is no documentation to indicate that Natural Products purchased chromite other than on the open market via private purchases. Although the government encouraged the development of domestic chromite mining during World War I, there was no World War I agency analogous to the MRC during World War II. Despite the creation of the MRC in August 1940, the OPM’s issuance of M-63 in December 1941, and the price cap put in place in November 1942, when the OPA enacted Maximum Price Regulation 258, private purchases of chromite ore continued pursuant to M-63 that allowed such purchases with WPB’s permission.

²⁵⁴ OPA, Press Release OPA-T-2973, 2/13/1945, PPGNPR0015481; and Healey, 9/7/1945, “History of Chrome Chemicals,” PPGNPR0008669-94 at PPGNPR0008677. Also see, OPA, Summary of Price Action, Action Number B6082-122, PPGNPR0813170; OPA, Summary of Price Action, 2/12/1945, USNPR0000598; and OPA, Rpt. 1335—Chemicals [MPR575], 2/12/1945, USNPR0000677-80. In October 1946, Natural Products petitioned to have the allowed price under Maximum Price Regulation 575 increased by one cent. See, “In the Matter of the Petition of the Natural Products Refining Co., of 902 Garfield Ave., Jersey City, N.J., Petition for Amendment of Maximum Price Regulation 575,” USNPR0000662-72.

²⁵⁵ MRC-NPRC Contract 6/8/1943, USNPR0000048; MRC-NPRC Contract, 10/2/1943, USNPR0000047; MRC-NPRC Contract, 12/8/1943, USNPR0000046; MRC-NPRC Contract, 4/14/1944, PPGNPR0007929-30; MRC-NPRC Contract, 6/13/1944, PPGNPR0007927-28; MRC-NPRC Contract, 8/3/1944, USNPR0000040-42; MRC-NPRC Contract, 9/19/1944, PPGNPR0007923-24; MRC-NPRC Contract, 10/21/1944, USNPR0000038-39; MRC-NPRC Contract, 12/12/1944, USNPR0000037; MRC-NPRC Contract, 2/28/1945, USNPR0000036; MRC-NPRC Contract, 4/19/1945, USNPR0000034; MRC-NPRC Contract, 6/21/1945, USNPR0000033; MRC-NPRC Contract, 10/19/1945, USNPR0000032; MRC-NPRC Contract, 1/3/1946, USNPR0000031; and MRC-NPRC Contract, 2/15/1946, USNPR0000030.

²⁵⁶ Ibid.

In December 1941, the OPM had issued Order M-63 “to conserve the supply and direct the distribution of designated materials in which shortages exist and which are imported [for] defense, essential civilian and other uses.” Thirteen minerals, including chromite, were subject to the order and were identified as “strategic materials.” After the effective date of this Order, no person, other than Metals Reserve Company and its governmental agents “shall, *without the written authorization* of the [OPM] Director of Priorities, make any contract or other arrangement for the importing of any Strategic Material.”²⁵⁷ In February 1942, for example, the Mutual Chemical Company thrice reported to the MRC that it was purchasing and importing South African Transvaal chrome ore.²⁵⁸

In late July 1943, a WPB official wrote that the “chromite consuming industry has...made strenuous efforts to maintain its own of supply of ore and to avoid dependence upon the Government for current supplies.” A prohibition on private South African chromite imports had led the chrome chemical industry to use “their stocks [which] have dropped to a seven month supply whereas in the two preceding years, it ha[d], with a few exceptions, been maintained as well over a year’s supply.”²⁵⁹

Because of the lack of importation from South Africa, due to a shipping shortage, the WPB recommended to the MRC that it sell South African Transvaal ore to the chemical chrome industry at \$2.00 below the OPA ceiling price.²⁶⁰ Although the MRC sold ore to the companies engaged in chrome chemical production, including Natural Products, from mid-1943 into 1946, sales to “private accounts” continued into mid-1944. In July 1944, for example, the WPB reported that from January through June 1944, 164,000 tons of chrome ore was imported into the United States of which “62,500 [was] for private account.” Imports for chemical use for that time period totaled 10,700 tons of which 6,000 was purchased by the government.²⁶¹

²⁵⁷ OPM, General Imports Order M-63, To Conserve the Supply and Direct the Distribution of Designated Materials in which Shortages Exist and which are Imported, 12/27/1941, USNPR0005930-32. Also see, OPM, General Imports Order M-63, To Conserve the Supply and Direct the Distribution of Designated Materials in which Shortages Exist and which are Imported, 3/14/1941, USNPR0005933-34.

²⁵⁸ Mackay to MRC, 2/28/1943, USNPR0004203; MRC to Mutual Chemical Co. of America, 2/26/1942, USNPR0004204; Mackay to MRC, 2/24/1942, USNPR0004205; and MacKay to MRC, 2/24/1945, USNPR0004206; MRC to Mutual Chemical Company of America, 2/12/1942, USNPR0004208; and Mutual Chemical Co. of America to MRC, 2/10/1942, USNPR0004210.

²⁵⁹ A. Laith to D. Smith, 7/30/1943, USNPR0004081-88 at USNPR0004084.

²⁶⁰ G. Bridgman, “Memorandum to the Treasurer,” 8/24/1943, PPGNPR0010457-58.

²⁶¹ A. Bateman to J. Douglass, 7/18/1944, PPGNPR0559330-37 at PPGNPR0559330. Examples of correspondences concerning MRC sales to Natural Products include: S. Stanton to S. Strauss, 4/14/1944, PPGNPR0015354; Strauss to Stanton, 3/14/1944, PPGNPR0015355; Stanton to MRC, 3/10/1944, PPGNPR0015357; and Stanton to Strauss, 3/30/1944, PPGNPR0015359.

E. NPRC Operations, Executive Personnel, and Waste Management during World War II

During World War II, NPRC continued with the senior executives that had directed the company's operations before the war. NPRC's principal executive officers were Henry A. Goman, President and Treasurer; S. W. Stanton, General Manager (signed many of the MRC contracts); J.J. Vetter, Plant Superintendent; William S. Rurode, Secretary; and Charles W. Bogart, Assistant Treasurer.²⁶²

The available documents do not reveal any actions or decisions by any federal agency specifically governing the manufacturing operations or waste handling activities at the NPRC plant during World War II. Further, no evidence has been found indicating that any federal personnel themselves held any executive positions in the company, conducted or directed any activities at the plant itself during that period, were stationed or had office space there, or visited the plant for any purpose during the war.

During 1942 through 1945, between 66 and 74 percent of NPRC's sales were of sodium bichromate, and between 9 and 14 percent were of potassium bichromate.²⁶³ NPRC's sales of its chemicals to the public were primarily through its distributor, American Cyanamid and Chemical Corp.²⁶⁴

During World War II, NPRC's production of its primary products sodium bichromate and potassium bichromate dropped significantly from 1941 to 1942.²⁶⁵ During several months in 1944 and again in 1945, NPRC used less chromite ore than the quota allocated to it by the WPB.²⁶⁶ The documents do not indicate any kind of Government action against NPRC as a result.

²⁶² Office of Price Administration, Annual Financial Report for fiscal year ended 12/31/1942, Natural Products Refining Corporation, 6/2/1944, USNPR0001260-77 at USNPR001265; T. Keeling, "Memorandum for the Chief, Materials Branch, Production Division, Headquarters, Army Service Forces," 2/18/1944, PPGNPR0027799-806 at PPGNPR0027802-04; Natural Products Refining Company History, n.d., COMP0000993-94.

²⁶³ Office of Price Administration, Annual Financial Report for fiscal year ended 12/31/1942, Natural Products Refining Corporation, 6/2/1944, USNPR0001260-77 at USNPR0001263; Office of Price Administration, Annual Financial Report for fiscal year ended 12/31/1944, Natural Products Refining Corporation, 4/4/1945, USNPR0001297-300 at 300; Office of Price Administration, Annual Financial Report for fiscal year ended 12/31/1943, Natural Products Refining Corporation, 5/23/1944, USNPR0001278-96 at 81; Office of Price Administration, Annual Financial Report for fiscal year ended 12/31/1945, Natural Products Refining Corporation, 5/6/1946, USNPR0001301-04.

²⁶⁴ OPA, Economic Brief on Chromates and Bichromates, circa. 1943, PPGNPR0611607-56 at PPGNPR0611624, PPGNPR0611652-56.

²⁶⁵ OPA, Economic Brief on Chromates and Bichromates, circa. 1943, PPGNPR0611607-56 at PPGNPR0611617-20.

²⁶⁶ E. Sanford to L. Levensaler, 12/27/1945, PPGNPR0014204-05E; Sanford to T. Ford, 5/4/1945, USNPR0004768; and E. Sanford to T. Ford, 5/19/1945, USNPR0004769.

NPRC reported total sales during the years 1942 through 1945 of \$1,683,654, \$1,502,231, \$1,636,856, and \$1,752,406, respectively.²⁶⁷ These figures were at or below NPRC's sales of \$1,671,145 and \$1,837,540 in 1939 and 1940, respectively.

Aerial photographs show that the large waste hills of chromate chemical manufacturing wastes that had existed as of November 1940 remained present during World War II.²⁶⁸

No evidence has been found to indicate that any agency of the federal government had any role in NPRC's handling of its chemical manufacturing wastes at its plant. The available information that exists indicates no federal role with respect to those wastes. A January, 23, 1942 New York Times article reported that two men were crushed to death and two others narrowly escaped serious injury the day before in an "avalanche of chemical residue at the Natural Products Refining Company at 902 Garfield Avenue" in Jersey City. It stated that the "dead were buried under twenty or more tons of the frost-hardened residue a short time after they had blasted a section from a huge pile and were preparing a second dynamite charge."²⁶⁹ Likewise, a 1944 NPRC workmen's compensation claim stated that an employee had dislocated his shoulder pushing a waste mud car.²⁷⁰

F. Labor Shortage at the NPRC and Other Chromate Plants during World War II

Various federal agencies worked to ameliorate the shortage of workers that existed at all but one of the chromate chemicals plants during much of World War II. The managements of the plants often solicited and urged such federal assistance.²⁷¹ These agencies included the United States Employment Service ("USES"), transferred in September 1942 to be part of the War Manpower Commission.²⁷² Aside from national personnel informing local offices of the importance of the chemicals and the shortage of labor, USES offices referred workers to the

²⁶⁷ Office of Price Administration, Annual Financial Report for fiscal year ended 12/31/1942, Natural Products Refining Corporation, 6/2/1944, USNPR0001260-77 at USNPR0001263; Office of Price Administration, Annual Financial Report for fiscal year ended 12/31/1944, Natural Products Refining Corporation, 4/4/1945, USNPR0001297-300 at 300; Office of Price Administration, Annual Financial Report for fiscal year ended 12/31/1943, Natural Products Refining Corporation, 5/23/1944, USNPR0001278-96 at 81; Office of Price Administration, Annual Financial Report for fiscal year ended 12/31/1945, Natural Products Refining Corporation, 5/6/1946, USNPR0001301-04.

²⁶⁸ 10/7/2016 Expert Report of Kristen K. Stout

²⁶⁹ *New York Times*, "Crushed In Avalanche, Two Jersey Workmen Victims of Chemical Residue Collapse," 1/23/1942, PPGNPR0000522.

²⁷⁰ State of New Jersey Accident Blank, 7/27/1944, PPGNPR0077154-55.

²⁷¹ WPB, Summary, Primary Chromium Chemical Producers Industry Advisory Committee, 7/6/1943, USNPR0006101-05 at 105; WPB, Summary, Primary Chromium Chemical Producers Industry Advisory Committee, 8/3/1943, USNPR0006106-12 at 107; Manual of the Manpower Budget Plan for the Newark, New Jersey Area, 11/25/1943, USNPR0000913-34.

²⁷² 9/17/42 Executive Order No. 9247, USNPR0006820-21.

manufacturers for consideration. The manufacturers then decided whether or not to employ those referred.²⁷³ The documents reveal no other significant actions by these agencies in the recruitment of workers, and no actions relating to the supervision of workers or the conditions in which they worked after any new workers were hired by the manufacturers.

The documents indicate that no directives or orders were issued by these agencies to NPRC or the other members of the industry.²⁷⁴ Moreover, I have found no documents indicating that, as some WPB personnel discussed in late 1944, any military personnel “check[ed] housekeeping conditions periodically” at NPRC or the other plants. In addition, it does not appear that during or after late 1944, an analysis of chromium chemicals requirements compared with present production was made in order for the Government to determine other actions that might be taken to overcome the manpower problems prevailing in the various production areas.²⁷⁵

These agencies were unsuccessful in their efforts to recruit an adequate number of workers for these companies during World War II, and this led to efforts to build a new plant in any area where the labor supply was not as limited.²⁷⁶ As of April 1945, all of the chromium chemical companies had experienced a net loss of personnel compared to June 1944, and the war ended with the problem unsolved.²⁷⁷ As of mid-1944 NPRC employed between 140 and 160 workers.²⁷⁸ By April 1945, NPRC employed 116 persons.²⁷⁹

The one wartime chromium chemicals plant which had an adequate labor supply during the war was the only one in which working conditions were considered good, and which was not located in what was called a critically tight labor market. This exception was Imperial Paper &

²⁷³ C. Hallon to Chief, Labor Branch, 4/15/1944, PPGNPR0027779.

²⁷⁴ See also C. Ray to L. Sherman, 9/9/1944, PPGNPR0012846-48; Chromium Chemicals Task Group Meeting Summary, 9/12/1944, USNPR0000298-301.

²⁷⁵ Chromium Chemical Labor Task Committee Meeting Summary, 11/6/1944, PPGNPR0029545-46.

²⁷⁶ WPB, Commodities Bureau, Chemical Division, Progress Report, 11/17/1943, PPGNPR0003297-98; WPB Commodities Bureau, Chemical Division, Progress Report for Week Ending November 13, 1943, 11/17/1943, USNPR0008940-41; M. Morton to J. Carey, 1/12/1944, PPGNPR0813140-41; WPB, For Immediate Release, 1/17/1944, PPG0813136-37; M. Morton to J. Carey, 1/18/1944, USNPR000601-02; Confidential Minutes, Meeting of the Priorities Committee, Newark Area, 1/19/1944, USNPR0000877-82; T. Killing, Memo to the Director, Chemicals Bureau, WPB, 1/5/1944, PPGNPR0027790; D. Morgan to L. Boulware, 2/18/1944, USNPR0005191-92; M. Perlow and W. Healey to J. Wizeman, 3/1/1944, PPGNPR0008726-30; War Manpower Commission, Industry Briefs, 7/6/1944, PPGNPR0013973-75.

²⁷⁷ Chromium Chemicals Task Group Meeting Transcript, 4/20/1945, USNPR0000302-38 at USNPR0000303, USNPR0000309; Chemical Task Group, “Transcript of Meeting,” 4/20/1945, PPGNPR0028119-56; J. Gould to M. Preston, 7/20/1945, USNPR0011096-97 at USNPR0011097; D. Morgan to R. Williams, 8/2/1945, PPGNPR0012698.

²⁷⁸ F. Sinclair to WPB, 6/27/1944, PPGNPR0012855-56 at 56; C. Ray to L. Sherman, 9/9/1944, PPGNPR0012846-48 at PPGNPR0012848.

²⁷⁹ Chemical Task Group, “Transcript of Meeting,” 4/20/1945, PPGNPR0028119-56 at PPGNPR0028125.

Color Co., in Glens Falls, New York, which was “producing on schedule and report[ed] no manpower problem.”²⁸⁰ A September 1944 WPB memorandum reported that “[w]orking conditions in all of the plants - except that in Glens Falls are such that recruits are reluctant to accept jobs” and those plants experienced a higher rate of turnover among those who did. The USPHS, which had investigated the problem, had advised that the accepted toxicity limit is .1 milligram per cubic meter of air. In the Glens Falls plant, the level was kept at .01 milligrams, but all of the other plants showed a toxicity of from .3 to 20 milligrams.²⁸¹

G. Industrial Hygiene in the Sodium Bichromate Industry

In 1932, Department of Commerce – Bureau of Mines Information Circular 6566 regarding Chromium included background information about the three different kinds of ore, the parts of the world from which it was produced, the uses of chromium chemicals, and properties of chromium. It stated that the “soluble chromium compounds are very poisonous.”²⁸² Exposure to this hazard was documented in 1936 in at least one reported New Jersey decision.²⁸³

During World War II, NPRC laborers continued to suffer injuries caused by exposure to chromate chemicals at the plant, as documented in company workmen's compensation forms to its insurers.²⁸⁴ A common theme in the WPB documents discussing the sodium bichromate industry during World War II was unhealthy working conditions, and that the Government understood that the manufacturers were responsible for improving those conditions. The WPB's history of chrome chemicals, written shortly after the war ended noted, “working conditions were dirty, as well as mildly toxic and dangerous because of the dust and fumes.”²⁸⁵

²⁸⁰ C. Ray to L. Sherman, 9/9/1944, PPGNPR0012846-48 at PPGNPR0012846.

²⁸¹ Chromium Chemicals Task Group Meeting Summary, 9/12/1944, USNPR0000298-301 at 300; PPGNPR0029539-46; Chemicals Division, Bureau of Reconversion Operations, Civilian Production Administration, “Report on Operations (July 1, 1945 to March 31, 1946), PPGNPR0012801-08; Chromium Chemicals Labor Task Committee Meeting Summary, 11/6/1944, PPGNPR0008737-44.

²⁸² Lewis A. Smith, Bureau of Mines, Chromium, General Information, 4/1932, PPGNPR0813035-41 at PPGNPR0813037.

²⁸³ Lewis A. Smith, Bureau of Mines, Chromium, General Information, 4/1932, PPGNPR0813035-41 at PPGNPR0813037.

²⁸⁴ State of New Jersey Accident Blank, 61/15/1943, PPGNPR0091968; State of New Jersey Accident Blank, 12/7/1942, PPGNPR0077143; State of New Jersey Accident Blank, 9/15/1943, PPGNPR0077144; State of New Jersey Accident Blank, 9/13/1943, PPGNPR0077150-51; State of New Jersey Accident Blank, 7/2/1947, PPGNPR0077153; State of New Jersey Accident Blank, 7/27/1944, PPGNPR0077154-55; State of New Jersey Accident Blank, 6/13/1946, PPGNPR0077165; State of New Jersey Accident Blank, 3/3/1949, PPGNPR0077169. For examples of similar health reports after World War II see, PPG, Doctor and Lost Time Injury Report, 1/5/1956, PPGNPR0077130-31; State of New Jersey Accident Blank, 1/5/1956, PPGNPR0077132; State of New Jersey Accident Blank, 1/7/1951, PPGNPR0077136; State of New Jersey Accident Blank, 5/12/1943, PPGNPR0077137; and State of New Jersey Accident Blank, 10/19/1949, PPGNPR0077152. Also see, L. Papp to D. Dailey, 1/16/1959, PPGNPR0077183-84. See also, *Koval v. Natural Products Refining Co.*, 55 A.2d 885 (N.J. 1947), regarding a worker who started working at plant in late 1945 treated for nasal perforation due to chrome poisoning.

²⁸⁵ Healey, 9/7/1945, History of Chrome Chemicals,” PPGNPR0008669-94 at PPGNPR0008671.

For example, an October 22, 1943 OPA memorandum discussed falling production in the face of rising requirements for chromium chemicals due primarily to labor shortages. The reasons for the labor shortage were: “Working in chromium chemicals plant present occupational hazards i.e., chrome sores, ulcers in stomach, perforated septums. . . . These hazards are not compensated for by a recognized increased wage scale. . . . In some instances wage scale is lower than that existing in neighboring plants, which offered more pleasant labor as well.” The suggestions and recommendations made at that time included modernizing equipment “thus removing hazards.”²⁸⁶

A WPB report the same day stated that “[w]orking in a chromium plant is a particularly hazardous occupation since the workers are subjected to chromium fumes and dust which cause chrome sores, chrome ulcers, and perforated septums. The wage rates in the plants are, according to the local representatives, lower than the prevailing rates for less hazardous occupations. As a result, the plants have been able to obtain only about eighty percent of the necessary operating labor.” A WPB representative stated that it would probably require an increase in pay of about fifteen cents per hour to bring these plants into competition with other equally important industries in the labor markets.” However, to the War Labor Board it did not appear that such an increase could be obtained. The OPA representative stated that it might be possible to raise ceiling prices of chromium chemicals if proven necessary.²⁸⁷

The agenda for a November 1943 meeting of the WPB's Primary Chromium Chemical Producers Industry Advisory Committee stated that the purpose of this meeting was “to secure information and recommendations from the committee” on certain subjects. The WPB asked that the committee members come to the meeting prepared to discuss, among other subjects: “What steps have been taken *by you* to eliminate chrome sores, chrome ulcers and perforated septums?”²⁸⁸

At that November 1943 PCCPAC meeting, however, a committee member sought to “refute[] the argument that employment in bichromate plants involves a definite personal danger with the statement that 50 percent of the employees in his company's plant have been on the job for 5 years or more,” and the claim that “such a record could hardly have been achieved had the alleged conditions actually prevailed.”²⁸⁹ Committee members also blamed the workers themselves. The WPB summary reported that “[i]ndustry members believed that the elimination

²⁸⁶ F. Bramble, Memo to Files, 10/22/1943, USNPR0000612.

²⁸⁷ WPB, Report on Meeting of Chromium Chemical Supply, 10/22/1943, PPGNPR0010669-71 at PPGNPR0010670.

²⁸⁸ Agenda, Meeting of the Primary Chrome Chemicals Producers Industry Advisory Committee, 11/11/1943, USNPR0000349.

²⁸⁹ Primary Chromium Chemical Producers Industry Advisory Committee, 11/11/1943, USNPR0006113-22 at USNPR0006114.

of chrome sores, chrome ulcers, and perforated septums could be accomplished through absolute cleanliness on the part of the employees. . . . Medical experience in the plant, one committee member said, has shown that, as a rule, the cause of perforated septums can be traced to soiled hands or unclean handkerchiefs. Cleanliness on the part of the employee cannot be overemphasized. One of the big problems is the unwillingness among some workers to follow precautionary measures prescribed by management.”²⁹⁰ Committee members also claimed at that meeting that the workers were simply lazy. While shipbuilding and aircraft industries paid higher wages for common labor than the chemicals industry, “workers are taking full advantage of this situation, particularly since many find it possible to receive a full day's pay without the need of doing a full day's work.”²⁹¹

At the request of the WPB, the United States Public Health Service prepared a December 1943 report, “Evaluation of the Health Hazards Due to Chromium Compounds in the Chromium Ore Reducing Plants in the United States,” specifically, the erosion of the skin and mucous membranes from chromium compounds, resulting in the perforated septum and in chrome ulcers.²⁹² In summary, the report stated that “[i]n general, the conditions found in the four plants [visited] are the worst ever encountered in an industry as a whole.”²⁹³

The plants visited did not include the NPRC plant. Five of the six plants operating in the United States were studied, “the sixth not electing to avail itself of this service.” The report detailed the conditions at the two Mutual Chemical Co. plants, the two Martin Dennis plants, and the Diamond Alkali Co. plant.²⁹⁴ The report included the results as to four plants, the results in the fifth plant having been reported earlier.²⁹⁵

The report also stated that “[a]ll of the plant managers realize the conditions within their respective plants. The conditions observed, *according to them*, are due to manpower shortage . .

²⁹⁰ Primary Chromium Chemical Producers Industry Advisory Committee, 11/11/1943, USNPR0006113-22 at USNPR0006115.

²⁹¹ Primary Chromium Chemical Producers Industry Advisory Committee, 11/11/1943, USNPR0006113-22 at USNPR0006115.

²⁹² T. Thomas and H. Seifert, “Evaluation of the Health Hazards Due to Chromium Compounds in the Chromium Ore Reducing Plants in the United States,” National Institute of Health, Division of Industrial Hygiene, 11/8-12/10/1943, PPGNPR0012857-71.

²⁹³ T. Thomas and H. Seifert, “Evaluation of the Health Hazards Due to Chromium Compounds in the Chromium Ore Reducing Plants in the United States,” National Institute of Health, Division of Industrial Hygiene, 11/8-12/10/1943, PPGNPR0012857-71 at PPGNPR0012869.

²⁹⁴ T. Thomas and H. Seifert, “Evaluation of the Health Hazards Due to Chromium Compounds in the Chromium Ore Reducing Plants in the United States,” National Institute of Health, Division of Industrial Hygiene, 11/8-12/10/1943, PPGNPR0012857-71 at PPGNPR0012859 and PPGNPR0012860-67.

²⁹⁵ T. Thomas and H. Seifert, “Evaluation of the Health Hazards Due to Chromium Compounds in the Chromium Ore Reducing Plants in the United States,” National Institute of Health, Division of Industrial Hygiene, 11/8-12/10/1943, PPGNPR0012857-71 at PPGNPR0012859.

. and to the necessity for keeping equipment in operation far beyond the normal inspection and repair period.”²⁹⁶ However, while the “managements of the respective plants all recognize this condition and appear willing and anxious to make any corrections *which they consider practical*,” those managers complained instead about “lack of competent manpower,” and the need for additional labor to clean up the plants and maintain them in good condition in order to address “safety and occupational disease hazards.”²⁹⁷

As noted, on February 1944 at a meeting of the Chemical Bureau Inorganic Section, unhealthful working conditions were considered a reason for the ongoing labor problems in the chromium chemical industry.²⁹⁸ A summary of a September 1944 meeting of the Chromium Chemicals Task Committee contained the following paragraph,

Working conditions in all of the plants-except that in Glens Falls are such that recruits are reluctant to accept jobs. Chrome dust in the atmosphere causes nasal perforations and chrome ulcers. The Public Health Service, which investigated the problem, stated that the accepted toxicity limit is .1 milligrams per cubic meter of air. In the Glens Falls plant, the limit is kept at .01 milligrams but all of the other plants showed a toxicity of from .3 to 20 milligrams.²⁹⁹

A March 3, 1945 WPB memorandum discussed the possibility of strikes in the chrome chemical industry and the author noted that “labor in bichromate plants continues in an unrestful state because of the inherent health hazards, and of greater importance, the fact that wage scales in some of the plants are below the prevailing rates in other industries in the vicinity of the plants.”³⁰⁰ As of July 1945, near the end of the war, it remained difficult to hire men for chromium chemical plants “because of the toxic conditions in the plants.”³⁰¹

World War II ended in Europe with Germany’s surrender on May 8, 1945, and in the Pacific with Japan’s surrender on August 14, 1945. As the war ended in Europe, the partial demobilization of the American economy and relaxation of controls was underway and accelerated in the second half of 1945.

²⁹⁶ T. Thomas and H. Seifert, “Evaluation of the Health Hazards Due to Chromium Compounds in the Chromium Ore Reducing Plants in the United States,” National Institute of Health, Division of Industrial Hygiene, 11/8-12/10/1943, PPGNPR0012857-71 at PPGNPR0012858 (emphasis added).

²⁹⁷ T. Thomas and H. Seifert, “Evaluation of the Health Hazards Due to Chromium Compounds in the Chromium Ore Reducing Plants in the United States,” National Institute of Health, Division of Industrial Hygiene, 11/8-12/10/1943, PPGNPR0012857-71 at PPGNPR0012869-70.

²⁹⁸ H. Neal, Meeting of Chemicals Bureau, Inorganic Section, WPB, 2/7/1944, PPGNPR0001881-82.

²⁹⁹ Chromium Chemicals Task Committee, 9/12/1944, PPGNPR0015935-38 at PPGNPR0015938.

³⁰⁰ J. Wizeman to Executive Committee, Chemicals Bureau, 3/5/1945, PPGNPR0008826-28 at PPGNPR0008827.

³⁰¹ J. Gould to M Preston, 7/20/1945, USNPR0011096-97 at USNPR0011097.

H. Conclusions Relating to NPRC during World War II

No documents found indicate that during World War II anyone employed by an agency of the United States ever issued or gave orders, instructions, or directions to NPRC directors, officers, managers, executives, supervisors, or hourly workers concerning how, when, or where to perform steps in the chromite processing or chromium chemical manufacturing processes at the Garfield Avenue plant.

No documents found indicate that during World War II any agency of the United States retained or held title to or an ownership interest in any chromite after the delivery of it by rail to the Garfield Avenue plant.

No documents found indicate that during World War II NPRC purchased any significant amount of high-grade or metallurgical grade chromite from an agency of the United States.

No documents found indicate that during World War II NPRC received any subsidy payments, rebates, reimbursements of losses or costs, credits, or price reductions or adjustments from any agency of the United States pursuant to any program, agreement, contract, or arrangement with any agency of the United States.

No documents found indicate that during World War II anyone employed by an agency of the United States ever issued or gave any orders or instructions to NPRC workers regarding how, when, or where to handle, manage, or dispose of residues, sludges, or wastes generated during chromite processing or chromium chemical manufacturing processes at the NPRC plant.

No documents found indicate that during World War II anyone employed by an agency of the United States possessed, handled, or disposed of residues, sludges, or wastes generated during chromite processing or chromium chemical manufacturing processes at the NPRC plant.

No documents found indicate that during World War II any agency of the United States ever purchased, or held title to or an ownership interest in, any residues, sludges, or wastes generated during chromite processing or chromium chemical manufacturing operations at the plant.

No documents found indicate that during or at any time after World War II NPRC ever requested that an agency of the United States remove from the plant or any other location any residues, sludges, or wastes that were generated during chromite processing or chromium chemical manufacturing operations at the NPRC plant.

No documents found indicate that during World War II NPRC at any time changed its practices regarding the reworking or reprocessing of chromite residues, sludges, or wastes at the Sites in order to extract additional chrome oxide from the ore.

No documents found indicate that during World War II an agency of the United States refused to allow or did not permit NPRC to conduct test runs to develop more efficient or less wasteful production techniques for processing chromite.

No documents found indicate that during World War II an agency of the United States requested, ordered, directed, or required that NPRC discard pieces of chromite larger than a certain size at the Sites.

No documents found indicate that during World War II an agency of the United States had any responsibilities regarding the control or reduction of worker health and safety risks with respect to chromium exposure or any other disease or injury risk through NPRC plant industrial hygiene or housekeeping measures or precautions.

The Government never issued any kind of approval or disapproval of any of NPRC's waste management or disposal practices, nor is there evidence to indicate that the Government had authority to do so. Similarly, the Government did not issue any approval or disapproval of any of NPRC's plant worker safety or industrial hygiene practices, nor is there evidence to indicate that the Government had authority to do so.

Actions of the MRC in buying, stockpiling, and selling chromium during World War II had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

Federal actions and regulations as promulgated by the ANMB, NDAC, OPM, SPAB, or the WPB to conserve, allocate, and regulate the use of scarce raw and semi-raw materials, including chromium and sodium bichromate, during World War II had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

Federal actions and regulations by the OPA to regulate the price of chromium chemicals during World War II had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

Federal actions to address persistent labor shortages in the chrome chemical industry had no effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

I have found no documentation showing that NPRC received any funding from the Defense Plant Corporation or the Reconstruction Finance Corporation during or before World War II.

No documents reviewed indicate that any agency of the United States ever owned any of the buildings, machinery, equipment, other facilities, or land at or near the Garfield Avenue plant during World War II.

No documents reviewed indicate that any employee or representative of any agency of the United States resided at or had designated office space at the Garfield Avenue plant during World War II.

I have found no documentation showing that NPRC filed for any Necessity Certificates during World War II.

Except for one contract with the Treasury Department I have not found any other supply contracts signed by the NPRC and the United States government.

Any federal actions, laws and regulations relating to who was allowed to purchase chemicals during World War II had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

Any federal actions, laws and regulations relating to what quantities of chemicals a purchaser could buy during World War II had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

Any federal actions, laws and regulations relating to the permitted uses of chemicals by the purchasers of them during World War II had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

Any federal actions, laws and regulations relating to the Government's designation of chromium ore or chemicals as either "strategic" or "critical" during World War II had no apparent bearing or effect on the day-to-day chemical manufacturing operations at the Garfield Avenue plant or the disposal of wastes from the manufacturing operations at that plant.

No documents found indicate that during World War II anyone employed by an agency of the United States ever issued or gave orders, instructions, or directions to NPRC directors, officers, managers, executives, supervisors, or hourly workers concerning how, when, or where to perform steps in the chromite processing or chromium chemical manufacturing processes at the Garfield Avenue plant.

The Government never seized or threatened the seizure or take-over of the Plant during World War II for any reason.

VI. The United States, Chromium Production, and Natural Products Refining Company: 1946-1964

A. Post-World War II Federal Agencies, Laws and Regulations: 1946-1950

1. Regulatory Rollback

The end of World War II in late summer 1945 brought a swift change to the American economy as demand and orders for war materiel quickly declined. Although some industries, such as the aircraft industry, endured a period of readjustment, other industries did well in the immediate months and years after the war ended. The chemical industry was an industry that did not suffer “reconversion problems... as most chemical products were used in the same form either war or peace.”³⁰²

The regulatory effort that developed before and during World War II quickly rolled back. On July 1, 1945, the WPB’s Chemical Bureau employed 352 people. Nine months later the Chemical Bureau could count forty employees.³⁰³ In June 1945 Congress abolished the MRC and DPC and transferred the functions of both agencies to the Reconstruction Finance Corporation.³⁰⁴ In September 1945, Executive Order 9617 abolished the War Manpower Commission and most remaining functions were transferred to the Department of Labor.³⁰⁵ In October 1945, Executive Order 9638 eliminated the WPB and replaced it with the Civilian Production Administration (CPA). Most of the conservation orders (M orders) and limitation orders (L orders) were repealed soon after the war ended.³⁰⁶ The CPA assumed the responsibilities of the MRC and oversaw sales from government stockpiles into 1946, including sales to Natural Products.³⁰⁷ In December 1946, the CPA, the OPA, and several other agencies were consolidated into the Office of Temporary Controls, Office for Emergency Management.³⁰⁸

³⁰² Chemicals Division, Bureau of Reconversion Operations, Civilian Production Administration, “Report on Operations,” July 1, 1945 to March 31, 1946, PPGNPR0812801-808 at PPGNPR0812803.

³⁰³ Chemicals Division, Bureau of Reconversion Operations, Civilian Production Administration, “Report on Operations,” July 1, 1945 to March 31, 1946, PPGNPR0812801-808 at PPGNPR0812803.

³⁰⁴ 59 Stat. 5, 6/30/1945; and 59 Stat. 10, 6/30/1945.

³⁰⁵ EO 9617, 9/19/1945.

³⁰⁶ EO 9638, 10/4/1945.

³⁰⁷ See for example, J. Whelan to S. Strauss, 12/28/1945, PPGNPR0963139; and Whelan to S. Strauss, 1/28/1946, PPGNPR0963138.

³⁰⁸ EO 9809, 12/12/1946.

2. The National Security Act of 1947

By 1947 the international situation had greatly deteriorated and would continue to do so for the remainder of the decade as Cold War tensions between the United States and the Soviet Union increased. By the end of the decade China had fallen to communist forces and the Soviets had detonated an atomic bomb. Europe was divided into two competing spheres. Although an isolationist pull again developed in the United States, the Truman Administration actively put into place a strong internationalist foreign policy that established the United States dominance in world affairs. Yet, a rollback of the American military occurred between 1945 and 1950. In fiscal year 1945 \$83 billion had been spent on national defense and 12 million Americans were in the armed services. By 1950, average annual spending had dropped to \$12 billion and fewer than 1.5 million people were in the military.³⁰⁹

Despite the reduction in spending and manpower Congress took steps to reorganize the nation's military including passage of the National Security Act of 1947. The Act included numerous policies to centralize and strengthen the nation's defenses including creation of the National Security Council and the National Military Establishment, subsequently renamed the Department of Defense in 1949. The Act also established the National Security Resources Board (NSRB) and the Munitions Board (MB) that together "would be responsible for industrial mobilization and weapons advancement."³¹⁰

Although the ANMB had lost much of its influence with the establishment of the WPB at the end of World War II it again came to the forefront of planning in the immediate postwar years. Even before passage of the National Security Act in July 1947, the ANMB had taken steps to stockpile raw materials. After passage of the National Security Act, the MB assumed the functions of the ANMB. The MB reported to the Secretary of Defense who in turn reported to the President. Yet, neither the MB nor the NSRB functioned well due to vaguely defined lines of authority. But, as discussed below, in 1947 the MB did publish the first postwar mobilization plan. The dysfunction of the MB-NSRB arrangement led Congress to pass the Defense Production Act (DPA) in September 1950 just a few months after North Korea invaded South Korea. Agencies created under the DPA assumed the functions of the MB, although the MB continued to operating during the war.³¹¹

³⁰⁹ Historical Office, Office of the Secretary of Defense, *Rearming for the Cold War, 1945-1960* (Washington, DC: Office of the Secretary of the Defense, 2012), p. 5.

³¹⁰ Historical Office, Office of the Secretary of Defense, *Rearming for the Cold War, 1945-1960* (Washington, DC: Office of the Secretary of the Defense, 2012), p. 5; and P. Koistinen, *State of War, The Political Economy of American Warfare, 1945-2011* (Lawrence, KS: University Press of Kansas, 2012), pp. 69, 80.

³¹¹ Koistinen, *State of War*, 80-81. The ANMB was officially terminated on 7/26/1947 when Congress passed 61 Stat. 505. President Truman officially abolished the MB as part of Reorganization Plan Number Six effective June 30, 1953.

3. Stockpiling Efforts 1945-1950

The Government continued to consider some or all of the three grades of chromite as among a large group of critical defense materials in the years after World War II. At various times during and after this period, the Government stockpiled such materials at various locations around the country.³¹² The available information does not indicate that the designation of chemical grade chromite as critical and any stockpiling of it by the Government made any difference to any kind of operations at NPRC's Garfield Avenue plant during and after this period.

In October 1945, the ANMB published its "Commodity Study on Chromium." The document reviewed the chromium situation in World War II and toward the end of the document it was noted that "only the approach of V-E Day" prevented the utilization of "our last ditch reserve." The report authors stressed the need to maintain peacetime stockpiles.³¹³ The ANMB soon took steps to develop stockpiles. In January 1946, it developed a list of strategic and critical materials. Chemical grade chromite was considered a "Group 'B'" meaning,

[t]he Army and Navy Munitions Board recommends their acquisition only to the extent that they may be made available for transfer from Government agencies because of adequacy of supply can be insured either by stimulation of existing North American production or by partial or complete use of available substitutes.³¹⁴

Metallurgical and refractory grade chromite were in "Group 'A,'" that consisted of materials for which a stockpile was the only way to guarantee "an adequate supply for a future emergency."³¹⁵

A year later, in January 1947, the Joint Chiefs of Staff circulated a document that listed "Approved Locations for Stockpiles of Strategic Materials." Two potential sites were listed for chemical grade chromite: the Ravenna Arsenal in Ravenna, OH, and the Seneca Ordnance in Kendaia, NY. The Umatilla Ordnance Works in Oregon and Sierra Ordnance Works in California were stockpile sites for chromite from domestic sources without an end use

³¹² Secretary of War and Secretary of the Navy, Report to Congress on Stockpiling, 7/23/1947, PPGNPR0010933-69; Report on Audit of the Reconstruction Finance Corporation and Affiliated Corporation Defense Supplies Corporation, 80th Congress, House Doc. 439, 11/20/1947, USNPR0001931-2090 at 1948; Munitions Board, Current List of Strategic and Critical Materials, 4/27/1949, PPGNPR0014894-96; The Munitions Board, *Stockpile Report to the Congress*, 1/23/1951, PPGNPR0028738-59 at 40, 42-43; E. Gibson to J. Boyd, 4/4/1951, PPGNPR0559254-56.

³¹³ Army-Navy Munitions Board, "Commodity Study On Chromium," 10/1945, PPGNPR0557987-8026 at PPGNPR0558011.

³¹⁴ ANMB, Current List of Strategic and Critical Materials, 1/14/1946, PPGNPR0558089-92.

³¹⁵ ANMB, Current List of Strategic and Critical Materials, 1/14/1946, PPGNPR0558089-92.

designation.³¹⁶ At the end of 1948, chemical grade chromite was stockpiled at these locations: Sierra Ordnance (Herlong, CA); Letterkenny Ordnance (Culbertson, PA); Naval Ammunition (Hawthorne, NV); at Bethlehem, Pittsburgh, Philadelphia, PA; Baltimore, MD; Coquille and Seneca, OR; Butte, MT; Nye and Yerka, CA; and Deming, NM. The total stockpile was 252,977 long tons.³¹⁷

In the late 1940s, as Cold War tensions increased, the military expressed renewed concern regarding stockpiling and more specific uses of chemicals such as chrome chemicals for leather tanning. The ANMB's Chemical Committee created a subcommittee, the "Munitions Board Leather Committee." The leather subcommittee then appointed another subcommittee on chrome chemicals and asked that its members write a report detailing the requirements for military rearmament and "5-year emergency period."³¹⁸ The board asked Enoch Perkins, Vice President of the Mutual Chemical Company of America to chair the committee. S.W. Stanton of Natural Products also served on the committee as did representatives of Martin Dennis, Diamond Alkali, U.S. Vanadium Corporation, and Imperial Paper. All five companies who had produced chrome chemicals during World War II, as well as U.S. Vanadium, were represented on the board and were in the position to offer government officials their collective opinions on chrome chemical production.³¹⁹

In mid-December 1948, the subcommittee, now under the Munitions Board, issued its report that included four opinions:

1. Supplies of chemical chromite are believed to be sufficient to permit capacity operation of all existing chemical plants requiring this material through 1949 but little is available for increasing inventories or for stockpiling in view of the current practice of using chemical ore for metallurgical purposes. Additional supplies will be necessary after 1949.
2. Present chemical plants and new capacity actually under construction are adequate to meet all foreseeable military and essential civilian demands of the rearmament program

³¹⁶ Joint Chiefs of Staff, "Approved Locations for Stockpiles of Strategic Materials," 1/14/1947, PPGNPR0558199-207. Also see, Memorandum for Joint Chiefs of Staff, "Locations of Strategic and Critical Material Stockpiles," PPGNPR0558195-98.

³¹⁷ S. Spalding, Memorandum for the Joint Chiefs of Staff, 3/23/1949, PPGNPR0559386-98 at PPGNPR0599388.

³¹⁸ National Military Establishment, Munitions Board, "Summary," 11/23/1948, PPGNPR0558254-6 at PPGNPR0558254.

³¹⁹ H. Vollrath to E. Perkins, 11/23/1948, PPGNPR0558324-30 at PPGNPR0558326-27. Also see, W. Crom, Memorandum for the Chairman, Subcommittee on Chrome Chemicals, Munitions Board Chemical Industry Advisory Committee, 11/5/1948, PPGNPR0558329-30.

and a future emergency. However, chromium chemicals will be in very short supply throughout 1949 as new capacity will not be completed until early in 1950.

3. Only Transvaal Grade B Friable chromite can now be considered usable for producing chemicals without reducing the effective capacity of chemical plants.

4. In order to assure an adequate supply of chemical chromite during an emergency a strategic stockpile of chemical chromite is essential.³²⁰

On December 28, 1948, the Munitions and Leather Committee met to discuss the report. A member of the committee remarked, “[a]s a result of the chemical chrome study, a new stockpile approach is presented since chemical chrome has not been stockpiled.”³²¹ A few days later Enoch Perkins, Chairman of the Chrome Chemicals subcommittee, wrote to the munitions board and said that at that time only metallurgical ore was “being acquired in any quantity for the national stockpile.”³²² On March 17, 1949, in response to the report calling for a stockpile of chrome ore for chemical use, the military decided to create a stockpile of chemical grade chromite. At the meeting it was noted that sodium bichromate was the primary chemical made from chemical grade ore and that sodium bichromate was the source for other chrome chemicals including chromic acid, chrome pigments, and tanning agents. Meeting members recommend a stockpile of 430,000 long tons.³²³

Throughout 1949, South Africa continued to be the primary source of ore for chrome chemicals. A December 1949 report stated that the “ore used by our domestic chrome chemical industry is exclusively chromite from the Transvaal in the Union of South Africa and is termed Grade B friable.”³²⁴

³²⁰ “A Report to the Munitions Board Chemicals Committee on the Current Chromium Chemical Situation in the United States,” 12/17/1948, USNPR0009038-60 at USNPR0009039.

³²¹ Munitions Board Leather Committee, “Summary,” 12/28/1948, PPGNPR0558251-53 at PPGNPR0558252.

³²² Perkins to Munson, 1/3/1949, PPGNPR0558319-23 at PPGNPR0558321. Also see, The Leather Committee, “Munitions Board Report on Sodium Bichromate for the Tanning of Leather,” 5/1949, PPGNPR0558274-94.

³²³ Munitions Board Meeting 3/17/1949, PPGNPR0029318-20. Also see, Niergrath to Perkins, 7/28/1949, PPGNPR0558311; and Interdepartmental Stockpile Committee, 2/6/1951, PPGNPR0015199-207.

³²⁴ J. Creston to J. Morgon, 5/31/1949, PPGNPR0558866 and Interdepartmental Stockpile Committee Memo, 12/30/1949, PPGNPR0558867-72 at PPGNPR0558868.

B. The Korean War: 1950-1953

1. Introduction

In June 1950, North Korean troops crossed the demilitarized zone and invaded South Korea. The United States, under the auspices of the United Nations, came to the aid of the South Korean government and military. American led troops pushed the North Korean advance north to the Yalu River. Chinese intervention pushed the American led troops back to the 38th parallel where a stalemate developed that last until July 1953.

2. The National Production Act

On September 8, 1950, in response to events on the Korean Peninsula, Congress passed the National Defense Production Act of 1950.³²⁵ The act gave the President powers similar to those that Congress gave the executive branch before and during World War II, although not in piecemeal fashion. The next day President Truman issued Executive Order 10161, delegating to various Federal officials the power given to the President by the National Defense Production Act.³²⁶ Within the Commerce Department the National Production Authority was created. Truman also created the Office of Defense Mobilization and appointed Charles Wilson of General Electric to run the agency. Wilson then created the National Production Administration that served to determine production priorities, quotas, and programs and industrial expansion. The National Production Authority initially was tasked with determining allocation and priorities for the war effort, but most of those responsibilities were later turned over the National Production Administration.³²⁷

Executive Order 10161 also authorized the Reconstruction Finance Corporation, “to make loans . . . to private business enterprises . . . for the expansion of capacity, the development of technological processes, and the production of essential materials, including the exploration, development, and mining of strategic and critical metals and minerals.”³²⁸ The Revenue Act of 1950 contained provisions similar to the Second Revenue Act of 1940 regarding accelerated depreciation for privately financed wartime business expansion. Under the 1950 law, accelerated

³²⁵ 64 Stat. 798, 9/8/1950.

³²⁶ Executive Order 10161, 15 Fed. Reg. 6105, 9/12/1950.

³²⁷ Historical Office, Office of the Secretary of Defense, *Rearming for the Cold War*, p. 83. The Secretary of Commerce abolished National Production Authority after the Korean War and its functions were merged into the Business and Defense Services Administration. See, Government Manual Online at wais.access.gpo.gov at p. 72

³²⁸ Executive Order 10161, 15 Fed. Reg. 6105, 9/12/1950, sec. 303(a).

depreciation would occur over a 60-month period. Businesses could apply for accelerated depreciation on facilities completed after December 31, 1949.³²⁹

Executive Order 10161 also authorized the General Services Administration “to purchase and make commitments to purchase metals, minerals, and other raw materials . . . for Government use or resale.”³³⁰ I have found documentation showing that Natural Products purchased ore from an agency of the Federal Government during the Korean War.

Executive Order 10161 authorized the Secretary of Labor “to utilize the functions vested in him so as to meet effectively the labor needs of defense industry and essential civilian employment.”³³¹

3. Stockpiling, the Defense Minerals Administration, and Proposed Chromite Allocation Order during the Korean War

On January 21, 1951, the Munitions Board transmitted to Congress its semi-annual *Report to the Congress on the Stockpiling Program* as required by Critical Materials Stock Piling Act of Public Law 520, passed in July 1946. The report detailed stockpiling activities from July through December 1950. From July 1, 1950 through January 6, 1951, Congress had appropriated \$2.92 billion for additional stockpile purchases. The stockpiling program, however, had fallen short in 1950. Although the objective was a stockpile valued at almost \$8.87 billion, the realized value was much less at just under \$2.72 billion. All three grades of chromite were on the list of seventy-one strategic and critical materials that Congress had authorized to be purchased on Public Law 520.³³²

Under Section 303(c) of Executive Order 10161 the Secretary of the Interior (SOI) was “authorized and directed to encourage the exploration, development, and mining of critical and strategic minerals and metals....”³³³ The SOI eventually created five new agencies as part of the country’s defense program including the Defense Minerals Administration (DMA). According to a Department of the Interior history, “[e]ach of these defense agencies collaborated from the beginning with that sector of private industry which was most concerned with the same natural

³²⁹ 64 Stat. 906, 9/27/1950.

³³⁰ Executive Order 10161, 15 Fed. Reg. 6105, 9/12/1950, sec. 303(b).

³³¹ Executive Order 10161, 15 Fed. Reg. 6105, 9/12/1950, sec. 601.

³³² The Munitions Board, *Stockpile Report to the Congress*, 1/23/1951, PPGNPR0028738-59 at PPGNPR0028739 and PPGNPR0028742-43.

³³³ Executive Order 10161, 15 Fed. Reg. 6105, 9/12/1950.

resources.”³³⁴ On September 13, 1950, James Boyd of the Bureau of Mines was appointed acting administrator of the DMA, a “provisional organization.” The Secretary of the Interior formally established the DMA on December 4, 1950.³³⁵ Between September and December 1950 officials began discussions concerning expanding mineral production. The History of the Defense Materials Procurement Agency (DMPA) noted that the DMA wanted to develop a method to encourage “exploration of known mineral ‘showings,’” especially ones that might produce strategic or critical minerals.³³⁶

In early April 1951, the Deputy Administrator of the DMA wrote to the agency’s administrator regarding chromite and transmitted a plan to increase the chromite stockpile. Regarding chemical grade ore specifically, either the stockpile of Transvaal ore needed to be increased or, the specifications for metallurgical ore needed changing to allow it to be stockpiled for chemical use. At that time 263,000 long tons were stockpiled although the objective was 670,000 long tons.³³⁷ In June 1951, the Defense Production Administration sought to increase the stockpile of chemical grade ore by 114,000 long tons. Anticipated use in 1951 was 214,000 long tons compared to actual use in 1950 that totaled 121,000 long tons. The increase was due to “a result of greatly increased military and defense supporting demand for chrome chemicals.”³³⁸

Given the shortage of chemical grade ore, in July 1951, the DPA asked the DMA to “immediately issue and place in effect an allocation order to control the distribution of chemical grade chromite.”³³⁹ However, an allocation order for chemical grade chromite was never written or issued. At the end of 1951, the overall supply situation seemed tenuous given that the on-hand inventory was 290,087 long tons, the “danger point” 325,000 tons, and the desired objective was 420,000 tons. Yet, the planned deliveries for the second half of 1951 had been

³³⁴ United States Department of the Interior, *Years of Progress, 1945-1952* (1952; reprint, Memphis, TN, 2012), p. 107.

³³⁵ Defense Materials Procurement Agency, *A History of the Program Division and the Domestic Expansion Division* (Washington, DC: 1953), pp. 4-5, National Archives and Records Administration, Record Group 291, Defense Materials Procurement Agency, 1949-1958, Entry 7, Box 1 (hereafter *DMPA History*).

³³⁶ *DMPA History*, p. 12; and United States Department of the Interior, *Years of Progress, 1945-1952*, 117-18. To correct administrative overlap and disagreement with the GSA, Truman issued Executive Order 10281, which created the Defense Materials Procurement Agency (DMPA). The DMPA soon assumed the functions of the DMA. In November, the DMPA administrator established the Defense Minerals Exploration Administration (DMEA) that assumed the exploration functions of the DMA. See, *United States Department of the Interior, Years of Progress, 1945-1952*, 120-21; *DMPA History*, pp. 25-26; and Executive Order 10281, 16 Fed. Reg. 8789, 8/30/1951; and Defense Minerals Exploration Administration (DMEA), <http://minerals.usgs.gov/dockets/dmea.htm>.

³³⁷ E. Gibson to J. Boyd, 4/4/1951, PPGNPR0029298-300 at PPGNPR0029298-99.

³³⁸ Defense Production Administration, 6/18/1951, PPGNPR0029309-10. Also see, Gibson to Walsh, 7/9/1951, USNPR003722-23.

³³⁹ Gibson to Walsh, 7/9/1951, USNPR003722-23.

short by less than 6,000 tons. Since July, the Bureau of Mines had assumed from the DMA the responsibility for preparing the allocation order, but had not done so. An official in the chemical division reported “that there is no problem now and none anticipated in meeting the requirements of chemical grade chromite for the chemical industry.” He further indicated that the chemical industry imported chromite only in the summer months.³⁴⁰

Efforts to increase the chromite chemical stockpile continued in the spring of 1952. On March 27, 1952, Manly Fleischman, DPA Administrator, issued a memorandum with instructions aimed at increasing the stockpile of chemical grade ore by 70,000 long tons and metallurgical grade ore by 290,000 long tons in 1952. Although Fleischman’s memorandum discussed nine points designed to increase supply he did not suggest allocation of chemical grade chromite.³⁴¹

4. The End of the Korean War

The standoff that developed in the winter of 1950-1951 along the 38th parallel continued for several years. Talks between the two sides finally resulted in an armistice in July 1953. Unlike what occurred after World War II when most wartime programs were eliminated and the size of the American military was greatly reduced, after Korea the United States remained in a state of military preparedness that lasted through the Cold War and in a somewhat reduced size to the present day.³⁴² Given its strategic importance, the United States National Defense Stockpile continues to stockpile chromite ore.³⁴³

5. Industrial Hygiene and Worker Safety at NPRC between the End of World War II and the End of the Korean War

In the years between the end of World War II and the end of the Korean War, NPRC employment held steady at about 120 men.³⁴⁴

³⁴⁰ E. Karl to D. Bowman, 2/1/1952, USNPR0003679-80; and Bowman to G. Ticoulat, 1/31/1952, PPGNPR0029315.

³⁴¹ M. Fleischman to A. Walsh, 3/27/1952, PPGNPR0559280-81. Also see, J. King to N. Knowles, 5/22/1952, PPNGPR0029296; and J. King to J. Young, 5/22/1952, USNPR0029297.

³⁴² Historians generally agree that the so-called Cold War that began after World War II ended with the collapse of the Soviet Union in 1991.

³⁴³ Acting Commissioner, Emergency Procurement Services to Director, Purchase Division, Emergency Procurement, 7/1/1953, PPGNPR0559282; and USGS, Chromium, Statistical Compendium, 1/11/2013, <http://minerals.usgs.gov/minerals/pubs/commodity/chromium.stat/>.

³⁴⁴ Industrial Directory of New Jersey, 1946 (Union City, NJ: Hudson Dispatch, 1946), USNPR0001781-83; Industrial Directory of New Jersey, 1949 (Union City, NJ: Hudson Dispatch, 1949), USNPR0001784-87.

After World War II, scientists published several articles based on studies concerning the growing belief that chromium chemicals caused lung cancer in those exposed to it, studies made at the request of the chromate chemicals industry.³⁴⁵ None of these studies and reports reflected a belief by anyone that persons outside of the chromate chemicals industry had any authority regarding working conditions or industrial hygiene practices at the plants of industry members.

For example, a 1948 article - "Cancer of the Respiratory System in the United States Chromate-producing Industry" - stated that in "1947, the management of one of the large producers of chromates in the United States became concerned with the incidence of lung cancer . . . among their employees. An analysis of the mortality data of this company, carried out by one of the authors . . . established the existence of high rates for lung cancer among the workers. . . . With a relationship between lung tumor and employment established in at least one situation in the chromate industry, the remaining members of the industry were appraised of the facts, and the investigation was then extended to include all companies engaged in the production of chromates in the United States."³⁴⁶ NPRC had a representative on the health committee of the chromate industry that "initiated" the study.

This 1948 article concluded in its analysis that the mortality data of the chromate-producing industry in the United States revealed a high death rate for cancer of the respiratory system among exposed employees. It noted that: (1) 21.8 percent of all deaths in the chromate industry were reported as being due to cancer of the respiratory system, a ratio 16 times the expected ratio of 1.3 percent. The individual ratios in five of the six plants ranged from 13 to 31 times the normal; (2) the crude death rate for cancer of the lung was 25 times the normal-the range of excess for the various plants being from 18 to 50-fold; (3) in 5 of 6 plants the death rates for lung cancer in the group 50 years of age and under ranged from 20 to 70 times that for a comparable industrial group; (4) the mortality rates for lung cancer at ages over 50 years ranged from 10 to 40 times that for a comparable industrial group.³⁴⁷

In 1949 and 1950, the United States Public Health Service conducted a study of air quality around the NPRC facility in Jersey City. The study was "an in-plant investigation." However, the people conducting the study did identify five sources of outdoor contamination: 1) the "Kiln Stack Discharge and Residue Dryer Discharge;" 2) "Mill Building Vents;" 3) "Sodium

³⁴⁵ H.G. Bourne, Jr. and H.T. Yee, "Occupational Cancer in a Chromate Plant – An Environmental Appraisal" *Industrial Medicine and Surgery*. Vol. 19, No. 12, 12/1950, pp. 563-567. PPGNPR0034982-86; Machle and Gregorius "Cancer of the Respiratory System in the United States Chromate-producing Industry," *Public Health Reports*, 8/1948 Vol. 63, No. 35, pp. 1114-1126, PPGNPR0009012-28 at PPGNPR0009015.

³⁴⁶ W. Machle and F. Gregorius "Cancer of the Respiratory System in the United States Chromate-producing Industry," *Public Health Reports*, 8/1948 Vol. 63, No. 35, pp. 1114-1126, PPGNPR0009012-28 at PPGNPR0009015-28.

³⁴⁷ W. Machle and F. Gregorius "Cancer of the Respiratory System in the United States Chromate-producing Industry," *Public Health Reports*, 8/1948 Vol. 63, No. 35, pp. 1114-1126, PPGNPR0009012-28 at PPGNPR0009015-28.

Bichromate Exhaust Stack;" 4) "Sodium Sulfate Dryer Discharge Stack;" and 5) "Residue or Ore Stock-piles." Twenty-three air samples taken in June 1950 had, on average, 0.12 milligrams of CrO₃ per cubic meter of air while seventy-two samples taken in the spring of 1949 averaged 0.21 milligrams. It was further noted that NPREC was the only plant in the area that released hexavalent chromium.³⁴⁸

The November 1950 edition of the American Medical Association Archives of Industrial Hygiene and Occupational Medicine included an article - "Pulmonary Carcinoma in Chromate Workers." It stated a number of papers had "been published during the past 15 years which indicate that some chromium compounds may play a role in the pathogenesis of pulmonary carcinoma, and the article reviewed that literature, with emphasis on the reports on this subject that had been published in German, in journals which were rather inaccessible in this country."³⁴⁹ However, this 1950 article concluded that the "papers published in the United States . . . present convincing data indicating an etiological relationship between exposure to chromates in the chromate-producing industry and cancer of the respiratory tract." Thus, they supported the observations of the German authors.³⁵⁰

The November 1950 article also presented an analysis of records of pulmonary carcinoma in chromate workers at two Baltimore hospitals located near a chromate-producing plant. The number of chromate workers among the lung cancer patients of these two hospitals during the past 15 to 20 years was compared with the number of chromate workers among other hospitalized groups selected as controls. Statistical analysis indicated that the percentage of chromate workers in the lung cancer group was significantly higher than the percentage of chromate workers in other hospitalized groups, used as controls, or than would be expected from the number of men who were employed at the chromate-producing plant.³⁵¹

In August 1951, the Industrial Medicine and Surgery journal published "Occupational Cancer and Other Health Hazards in a Chromate Plant: A Medical Appraisal, I. Lung Cancers in Chromate Workers" about an Ohio plant. The article reported on a comprehensive study of the past and present workers in the plant, and compared the ratio of deaths from cancers among them to those in Lake County, Ohio generally. It reported that 18.2 percent of the chromate plant worker deaths were due to cancer of the respiratory system, compared to 1.2 percent of deaths in

³⁴⁸ Public Health Service, Air Pollution from Natural Products Company, Jersey City, NJ, 8/18/1950, PPGNPR0167834-37.

³⁴⁹ A. Baetjer, "Pulmonary Carcinoma in Chromate Workers," *American Medical Association Archives of Industrial Hygiene and Occupational Medicine*, Vol. 2, No. 5, pp. 487-512, PPGNPR0070607-32 at PPGNPR0070608.

³⁵⁰ A. Baetjer, "Pulmonary Carcinoma in Chromate Workers," *American Medical Association Archives of Industrial Hygiene and Occupational Medicine*, Vol. 2, No. 5, pp. 487-512, PPGNPR0070607-32 at PPGNPR0070612.

³⁵¹ A. Baetjer, "Pulmonary Carcinoma in Chromate Workers," *American Medical Association Archives of Industrial Hygiene and Occupational Medicine*, Vol. 2, No. 5, pp. 487-512, PPGNPR0070607-32 at PPGNPR0070630.

Lake County generally. Deaths from all cancers accounted for 27.2 percent among the workers compared to 10.2 percent in Lake County generally.³⁵² These differences were considered “very large” and the probability that they were due to chance was considered to be “extremely remote.”³⁵³ Thus, this “epidemiological study of lung cancer deaths among the workers of a chromate plant showed that the lung cancer death rate for all deaths is among chromate workers approximately 15 times that of the general population living in the county in which the plant is located. This occupational group representing 1% of the labor force of the County accounted for 10.8% of the total respiratory cancer deaths recorded by residence and occurrence in the County over a 12-year period.”³⁵⁴

A circa 1953 USPHS report – “Health of Workers in Chromate Producing Industry” – stated that in “recent years, suspicion has steadily increased of carcinogenic hazards in the chromate producing industry.” “In the absence of a comprehensive clinical and environmental study, the Public Health Service was requested by the industry to undertake such an investigation.”³⁵⁵ This investigation included the medical examination of 897 chromate workers. The resulting data showed a rate for “bronchiogenic cancer of 1,115 per 100,000 persons for chromate workers which is far above that found among a comparison group.”³⁵⁶ The comparison group study showed 20.8 lung cancer cases per 100,000 people.³⁵⁷ It also stated that a “study of the morbidity and mortality experience of male members of sick benefit associations in seven chromate-producing plants showed a great excess of cancer of the respiratory system. There were nearly 29 times as many deaths from respiratory cancer among chromate workers as would be expected based on the experience of all males in the United States.”³⁵⁸

³⁵² T. Mancuso and W. Hueper, “Occupational Cancer and Other Health Hazards in a Chromate Plant: A Medical Appraisal,” *Industrial Medicine and Surgery*, Vol. 20, No. 8, 8/1951, pp. 358-363, PPGNPR0083710-16 at PPGNPR0083711.

³⁵³ T. Mancuso and W. Hueper, “Occupational Cancer and Other Health Hazards in a Chromate Plant: A Medical Appraisal,” *Industrial Medicine and Surgery*, Vol. 20, No. 8, 8/1951, pp. 358-363, PPGNPR0083710-16.

³⁵⁴ T. Mancuso and W. Hueper, “Occupational Cancer and Other Health Hazards in a Chromate Plant: A Medical Appraisal,” *Industrial Medicine and Surgery*, Vol. 20, No. 8, 8/1951, pp. 358-363, PPGNPR0083710-16 at PPGNPR0083716. Industry representatives reacted with alarm to the “damage” this article could cause due to worker claims against the companies. G. Benington to J. Sargent, 8/2/1951, PPGNPR0033439-40. A copy of this letter was sent to “Wm. Rurode,” an employee for NPRC. G. Benington to J. Sargent, 8/2/1951, PPGNPR0033439-40 at PPGNPR0033440. See Office of Price Administration, Annual Financial Report for fiscal year ended 12/31/1942, Natural Products Refining Corporation, 6/2/1944, USNPR0001260-77 at USNPR0001265.

³⁵⁵ Public Health Service, *Health of Workers in Chromate Producing Industry*, circa 1953, PPGNPR0031751-903 at PPGNPR0031757. (For date, see additional copy of study, PGNPR0032204-357 at PPGNPR0032205.)

³⁵⁶ Public Health Service, *Health of Workers in Chromate Producing Industry*, circa 1953, PPGNPR0031751-903 at PPGNPR0031765-66.

³⁵⁷ Public Health Service, *Health of Workers in Chromate Producing Industry*, circa 1953, PPGNPR0031751-903 at PPGNPR0031881.

³⁵⁸ Public Health Service, *Health of Workers in Chromate Producing Industry*, circa 1953, PPGNPR0031751-903 at PPGNPR0031766.

This USPHS report was also based upon environmental investigations made in six plants involved in the manufacture of chromates and bichromates from chromite ore, located in Maryland, New Jersey, Ohio, and New York, and employing a total of approximately 1,200 persons.³⁵⁹ Based upon this study, the report made the following recommendations: the control of the dusts required the application of established industrial hygiene engineering principles; facilities and competent personnel should be provided to perform routine air analyses throughout each of the plants; adequate dust control features should be incorporated in the design of all new equipment and in the redesign of old equipment; more complete enclosure of process and conveying systems as well as greater use of local exhaust ventilation should be practiced; housekeeping should be perfected to prevent accumulation of dusts and spillage; until air concentration could be reduced to a safe level in certain areas or special operations, personal protective devices should be used.”³⁶⁰

C. The Natural Products Refining Company and the Columbia Southern Chemicals Company: 1954-1964

1. Pittsburgh Plate Glass Company's Purchase of NPRC

In mid-1954, Pittsburgh Plate Glass (PPG) purchased the Natural Products Refining Company and in doing so “became a producer of sodium bichromate, sodium sulfate, potassium bichromate . . . products used in the pigments and also in tanning and metal treatment.”³⁶¹ Under a July 7, 1954 reorganization plan agreed to by PPG and Natural Products, NPRC agreed to “sell, assign, set over and deliver to” PPG all assets. The indenture between National Products and PPG listed three tracts of land. The first tract was the original tract that NPRC was located on bordered by Garfield, Jane, and Commercial Streets and Carteret Avenue. The second was .62 acre tract that Natural Products had purchased in 1944. The third tract was land conveyed to the Natural Products by Lehigh Railroad Company in 1937.³⁶² Later in 1954, PPG transferred

³⁵⁹ Public Health Service, *Health of Workers in Chromate Producing Industry*, circa 1953, PPGNPR0031751-903 at PPGNPR0031765.

³⁶⁰ Public Health Service, *Health of Workers in Chromate Producing Industry*, circa 1953, PPGNPR0031751-903 at PPGNPR0031766-67.

³⁶¹ Pittsburgh Plate Glass Company, *Seventy-first Annual Report, 1954*, USNPR0006414-35 at USNPR0006425; Photograph, “Taken from mud pile in back of plant,” PPG Photographic Department, Negative No. 5270-2, PPGNPR0723065-66; Photograph, “Electrostatic PDTR'S,” PPG Photographic Department, Negative No. 5270-33, PPGNPR0723067-68; Photograph, “Taken from R.R. Trestle,” PPG Photographic Department, Negative No. 5270-10, PPGNPR0723069-70; Photograph, “Jersey City (Chem),” PPG Photographic Department, Negative No. 5270-8, PPGNPR0723071-72; Photograph, “Jersey City (Chem),” PPG Photographic Department, Negative No. 5270-9, PPGNPR0723073-74; M. Terril, Deposition Transcript, 4/27/2016 pp. 483-487.

³⁶² Plan of Reorganization, 7/8/1954, PPGNPR0659913-23 at PPGNPR0659914; and Indenture Between NPRC and Pittsburgh Plate Glass Company of Pittsburgh, PA, 7/20/1954, PPGNPR0659881-85.

ownership of what it had purchased from NPRC to PPG's wholly-owned subsidiary, Columbia-Southern Chemical Corporation (CSSC).³⁶³

The July 8, 1954 NPRC Plan of Reorganization incorporated NPRC's agreement to sell to PPG- "all of the assets of Natural as of the date of this agreement . . . and all of the business and good will of Natural including any and all patents, patent rights, know-how, technical information, books, records, customers' lists, and other property of whatsoever nature, save only as hereinafter expressly provided."³⁶⁴ These assets included all land now occupied or used in any manner or held for use by Natural in any of its operations.³⁶⁵ A July 20, 1954 deed from NPRC to PPG described and conveyed these three tracts of land.³⁶⁶ The sale also included "all machinery, fixtures, fittings, equipment, inventories, personal property, and other property."³⁶⁷

The Plan of Reorganization also provided that PPG "assume[d] and agree[d] to discharge the following liabilities: a pension plan; a contributory plan of group life insurance; a non-contributory plan for temporary disability; a current labor contract;" a "current sales contract with American Cyanamid Company"; "[c]urrent contracts for fuel, soda, ash, sulphuric acid, and chrome ore, made in ordinary course of trade for usual requirements of Natural."³⁶⁸ The Plan provided that PPG would assume and pay the "current liabilities set forth on said balance sheet of March 31, 1954 as shown in said Schedule A in the amount of \$221,436.76."³⁶⁹ NPRC represented that as of that time, there were "no liabilities of Natural of any nature whatsoever other than as shown" on that balance sheet except those listed.³⁷⁰ As of the date of the closing for this transaction, Frances Ferguson would be the sole stockholder of Natural, and PPG would issue and deliver shares of its common stock to her as payment.³⁷¹

The transactions between NPRC and PPG included an August 24, 1954 Amendment to the NPRC Pension Trust Agreement dated May 15, 1950, an amendment signed by NPRC, PPG, and

³⁶³ Conveyance, Pittsburgh Plate Glass to Columbia-Southern Chemical Corporation, 9/1/1954, PPGNPR0659946-47; Deed, Pittsburgh Plate Glass to Columbia-Southern Chemical Corporation, 12/22/1954, PPGNPR0659886-92; Pittsburgh Plate Glass Company, *Seventy-first Annual Report, 1954*, USNPR0006414-36 at 30.

³⁶⁴ NPRC and PPG, Plan of Reorganization, 7/8/1954, PPGNPR0659913-23 at PPGNPR0659914.

³⁶⁵ NPRC and PPG, Plan of Reorganization, 7/8/1954, PPGNPR0659913-23 at PPGNPR0659917-18.

³⁶⁶ Deed, NPRC to PPG, 7/20/1954, PPGNPR0659881-85.

³⁶⁷ NPRC and PPG, Plan of Reorganization, 7/8/1954, PPGNPR0659913-23 at PPGNPR0659918; Bill of Sale, NPRC to PPG, 7/20/1954, PPGNPR0659894-912.

³⁶⁸ NPRC and PPG, Plan of Reorganization, 7/8/1954, PPGNPR0659913-23 at PPGNPR0659915-17.

³⁶⁹ NPRC and PPG, Plan of Reorganization, 7/8/1954, PPGNPR0659913-23 at PPGNPR0659915.

³⁷⁰ NPRC and PPG, Plan of Reorganization, 7/8/1954, PPGNPR0659913-23 at PPGNPR0659916-17.

³⁷¹ NPRC and PPG, Plan of Reorganization, 7/8/1954, PPGNPR0659913-23 at PPGNPR0659914-15, PPGNPR0659922-23.

the Trustees F.J. Froehling, Louis R. Papp and William S. Rurode. The Amendment substituted PPG for NPRC pursuant to the terms of the July 8, 1954 Plan of Reorganization.³⁷²

In 1955 and 1956, Columbia Southern purchased additional tracts of land surrounding the plant as depicted in aerial photographs of the site and recorded in real estate deeds.³⁷³ In addition, during 1958, for example, CSCC had an average of between 175 and 181 employees.³⁷⁴

Between mid-1954 and late 1963, CSCC continued manufacturing the same products at the Garfield Avenue plant that NPRC had manufactured. CSCC did so with essentially the same plant manufacturing facilities and processes,³⁷⁵ operated with many of the same management personnel and laborers who had worked for NPRC,³⁷⁶ and even retained the same outside attorney that had represented NPRC for many years.³⁷⁷

³⁷² Amendment to Pension Trust Agreement, NPRC, PPG and Trustees, 8/24/1954, PPGNPR0725033.

³⁷³ 10/7/2016 Expert Report of Kristen K. Stout, at Figure 7.22.

³⁷⁴ PPG, Monthly Summary of D.O. Complaints and Claims, December 1958, PPGNPR0077284-85; PPG, Monthly Summary of D.O. Complaints and Claims, November 1958, PPGNPR0077286-87; PPG, Monthly Summary of D.O. Complaints and Claims, October 1958, PPGNPR0077288-89; PPG, Monthly Summary of D.O. Complaints and Claims, September 1958, PPGNPR0077290-91; PPG, Monthly Summary of D.O. Complaints and Claims, August 1958, PPGNPR0077292-93; PPG, Monthly Summary of D.O. Complaints and Claims, July 1958, PPGNPR0077294-95; PPG, Monthly Summary of D.O. Complaints and Claims, June 1958, PPGNPR0077296-97; PPG, Monthly Summary of D.O. Complaints and Claims, May 1958, PPGNPR0077298-99; PPG, Monthly Summary of D.O. Complaints and Claims, April 1958, PPGNPR0077300-01; PPG, Monthly Summary of D.O. Complaints and Claims, March 1958, PPGNPR0077302-03; PPG, Monthly Summary of D.O. Complaints and Claims, January 1958, PPGNPR0077306-07.

³⁷⁵ Deposition of Donald Dailey Sr., Ultramar Petroleum Inc v. PPG, United States District Court of New Jersey, C.A. No. 88-4767 (HLS), 6/13/1989, PPGNPR0169107-248 at PPGNPR0169164-65, PPGNPR0169212-13, PPGNPR0169217, PPGNPR0169219-22.

³⁷⁶ Deposition of Frederick J. Froehling, Exxon Corp v. PPG Industries, et. al. Docket No. C-001301-90, 2/12/1991, PPGNPR0063393-492 at PPGNPR0063401-406, PPGNPR0063410-11, PPGNPR0063437-38, PPGNPR0063474, PPGNPR0063481-82, PPGNPR0063487-88; Continued Deposition of Frederick J. Froehling, Exxon Corp v. PPG Industries, et. al. Docket No. C-001301-90, 2/13/1991, PPGNPR0063547-50, PPGNPR0063558-59; Deposition of E. Warren Fairbanks, Exxon Corp v. PPG Industries, et. al., Docket No. C-001301-90, 3/7/1991, PPGNPR0074910-5036 at PPGNPR0074936-37; Continued Deposition of Robert Widing, Exxon Corp v. PPG Industries, et. al., Docket No. C-001301-90, 1/29/1991, PPGNPR0070184-340 at PPGNPR0070239-41; Deposition of C.E. von Waaden, Exxon Corp v. PPG Industries, et. al., Superior Court of New Jersey, Hudson County Docket No. W-001301-90, 2/8/1991, PPGNPR0027520-701 at PPGNPR0027567, PPGNPR0027584-85, PPGNPR0027592-93, PPGNPR0027596-98; L. Papp to R. Weidele, 11/28/1960, PPGNPR0721509; L. Papp to W. Gibler, 2/13/1963, PPGNPR0721601; L. Papp to W. Gibler, 3/4/1963, PPGNPR0721780; L. Papp to R. Sherlock, 5/29/1963, PPGNPR0721493; L. Papp to R. Sherlock, 6/20/1963, PPGNPR0721642-43; LP to R. Sherlock, 12/26/1963, PPGNPR0721792; LP to W. Gibler, 12/26/1963, PPGNPR0721801; L. Papp to W. Gibler, 2/19/1964, PPGNPR0721736-37; L. Papp to R. Sherlock, 4/13/1964, PPGNPR0721731; L. Papp to R. Sherlock, 3/24/1965, PPGNPR0721562; L. Papp to R. Sherlock, 6/1/1965, PPGNPR0721765; L. Papp to R. Sherlock, 8/20/1965, PPGNPR0721496; L. Papp to R. Sherlock, 8/23/1965, PPGNPR0721498; L. Papp to R. Petti, 10/21/1965, PPGNPR0721686; L. Papp to W. Gibler, 11/11/1965, PPGNPR0721659; Deposition of Robert Widing, Exxon Corp v. PPG Industries, et. al., Docket No. C-001301-90, 1/28/1991, PPGNPR0069717-906 at PPGNPR0069742-47, PPGNPR0069760-61, PPGNPR0069826-27; Plaintiff PPG Industries, Inc.'s Objections and Responses to CGL Defendants' First Set of Joint Interrogatories, PPG Industries Inc. v. Accident and Casualty Insurance Company of Winterthur, et. al., Superior Court of the State of New Jersey, No. HUD-L-1845-95, 6/4/1996, PPGNPR0056686-

Columbia Southern also continued NPRC's practices of disposing of the chemical manufacturing wastes generated at the plant on the large hills on its property, and of selling or giving it away to contractors and local governments.³⁷⁸ The parties in this litigation have found no documents indicating that either NPRC or CSCC ever advised or asked an agency of the United States to remove any such wastes allegedly belonging to the federal Government from any of the sites at issue in this case, or that NPRC or CSCC was selling or giving away such Government-owned property to third parties, or asked Government permission to do so. Likewise, the parties in this litigation have found no documents indicating that any agency of the United States ever expressed an understanding that the Government owned any of those wastes or had any intention to remove them from NPRC's or CSCC's Jersey City property. In addition,

825 at PPGNPR0056701-702, PPGNPR0056720-21, PPGNPR0056730-31; June 22, 1984 Milczarek Report, PPGNPR0557613-736 at 624A.

³⁷⁷ Deposition of Frederick J. Froehling, Exxon Corp v. PPG Industries, et. al. Docket No. C-001301-90, 2/12/1991, PPGNPR0063393-492 at PPGNPR0063437-38; Continued Deposition of Robert Widing, Exxon Corp v. PPG Industries, et. al., Docket No. C-001301-90, 4/19/1991, PPGNPR0070341-447 at PPGNPR0070416-17; Memo re: Natural Products Refining Company fill, 4/11/1952, PPGNPR0132615; Memorandum of Closing, NPRC and PPG, circa 7/20/1954, PPGNPR0659952-53; Title Closing Statement, Clorox Company and Pittsburgh Plate Glass Company, 8/6/1962, PPGNPR0660383; A. Leith to P. Reed, 12/12/1941, USNPR0003976-78.

³⁷⁸ Plaintiff PPG Industries, Inc.'s Objections and Responses to CGL Defendants' First Set of Joint Interrogatories, PPG Industries Inc. v. Accident and Casualty Insurance Company of Winterthur, et. al., Superior Court of the State of New Jersey, No. HUD-L-1845-95, 6/4/1996, PPGNPR0056826-90 at 854; Deposition of Robert Widing, Exxon Corp v. PPG Industries, et. al., Docket No. C-001301-90, 1/28/1991, PPGNPR0069717-906 at PPGNPR0069728, PPGNPR0069812-20, PPGNPR0069835, PPGNPR0069855-60, PPGNPR0069863-64; Memo re: Natural Products Refining Company fill, 4/11/1952, PPGNPR0132615; Continued Deposition of E. Warren Fairbanks, Exxon Corp v. PPG Industries, et. al. 4/11/1991, Docket No. C-001301-90, PPGNPR0074768-851 at PPGNPR0074827-29; Continued Deposition of E. Warren Fairbanks, Exxon Corp v. PPG Industries, et. al. 4/16/1991, Docket No. C-001301-90, PPGNPR0074719-67 at PPGNPR0074727-31, PPGNPR0074750-51; PPG Industries Inc.'s Supplemental Answers to Plaintiff's First Set of Interrogatories, Exxon v. PPG Industries, Inc., et. al., Docket No. W-001301-90, 2/12/1991, PPGNPR0056558-71 at PPGNPR0056563-64; PPG Industries Inc.'s Answers and Objections to Plaintiff's Interrogatories, David Hoffman, et. al. v. Michael Totaro, et. al., Docket No. W-28775-89, 3/1/1991, PPGNPR0154456-510 at 472-73; Continued Deposition of Robert Widing, Exxon Corp v. PPG Industries, et. al., Docket No. C-001301-90, 4/19/1991, PPGNPR0070341-447 at PPGNPR0070346, PPGNPR0070376-77; Answers to Interrogatories, New Jersey Turnpike Authority v. PPG Industries Inc., et. al., United States District Court for New Jersey, Civil Docket No. 93-2037, 8/10/1993, PPGNPR0139748-77 at PPGNPR0139758, PPGNPR0139766, PPGNPR0139768; Plaintiff PPG Industries Inc.'s Objections and Responses to Certain First-Party Defendants' First Set of Consolidated Interrogatories and Notice to Produce Documents, PPG Industries, Inc. v. Accident and Casualty Insurance Company of Winterthur, et. al., Superior Court of New Jersey, Hudson County Docket No. HUD-L-1845-95, 6/4/1996, PPGNPR0056573-673 at PPGNPR0056583-85; F. Froehling to D. Dailey, 6/21/1965, PPGNPR0089377-78; Deposition of Chester J. Milczarek, Jersey City Redevelopment Authority v. PPG Industries inc. and Internal Fidelity Insurance Company, United States District Court for New Jersey, Docket No. 85-2014 (HLS), 3/27/1987, PPGNPR0067542-683 at PPGNPR0067557, PPGNPR0067571-72, PPGNPR0067583; Transcript of Proceedings, Jersey City Redevelopment Authority v. PPG Industries, Et al. Civil No. 85-2014, United States District Court for the District of New Jersey, 7/1/1987, PPGNPR0067685-905 at PPGNPR0067787-89, PPGNPR0067882-83; Deposition of Donald Dailey Sr., Ultramar Petroleum Inc v. PPG, United States District Court of New Jersey, C.A. No. 88-4767 (HLS), 6/13/1989, PPGNPR0169107-248 at PPGNPR0169147-48, PPGNPR0169153-55, PPGNPR0169162. *See also Hoff v. NPRC*, 118 A.2d 714 (N.J. Super. Ct. 1955).

I have found no evidence that NPRC or CSCC ever forwarded any proceeds from the wastes sales to third parties to the Government.³⁷⁹

The three CSCC Works Managers between 1946 and 1963 were generally responsible for the operation of the entire plant and all aspects of it, including the roughly 150 people who worked there as of 1957, and for the other supervisory personnel reported to them. The CSCC Production Superintendents there were responsible for overseeing the production of the chemical products and the operation of the plant. The plant operated around the clock in three eight-hour shifts.³⁸⁰

A 1957 memorandum by CSCC's Frederick J. Froehling responded to an August 1957 request by other CSCC executives and discussed whether or not to invest an additional \$2,255,000 in order to renovate the Jersey City plant.³⁸¹ He noted in part that it would produce plant income of only approximately \$107,000 annually, and ultimately concluded that "further capital investments should be limited to the most economical renovations . . . to improve product quality . . . maintain our present share of the Bichromate market but also assist in obtaining a share of the small growth potential." Doing so would not only "protect our present investment" but also "protect our current market position while awaiting the outcome of the prevailing harassment from the neighbors about dust, etc." It would also provide CSCC with time "without serious financial detriment" to "study new production techniques, and locations (if made

³⁷⁹ M. Terril, Deposition Transcript, 4/14/2015 p. 93-21:25.

³⁸⁰ PPG Industries Inc.'s Supplemental Answers to Plaintiff's First Set of Interrogatories, Exxon Corporation v. PPG Industries Inc. et. al., Superior Court of New Jersey, Hudson County Civil Docket No. W-001301-90, circa 2/12/1991, PPGNPR0056557-71 at PPGNPR0056558-59, PPGNPR0056567-68; Deposition of Chester J. Milczarek, Jersey City Redevelopment Authority v. PPG Industries inc. and Internal Fidelity Insurance Company, United States District Court for New Jersey, Docket No. 85-2014 (HLS), 3/27/1987, PPGNPR0067542-683 at PPGNPR0067621-23; Transcript of Proceedings, Jersey City Redevelopment Authority v. PPG Industries, Et al. Civil No. 85-2014, United States District Court for the District of New Jersey, 7/1/1987, PPGNPR0067685-905 at PPGNPR0067782; Deposition of Donald Dailey Sr., Ultramar Petroleum Inc v. PPG, United States District Court of New Jersey, C.A. No. 88-4767 (HLS), 6/13/1989, PPGNPR0169107-248 at PPGNPR0169118, PPGNPR0169126, PPGNPR0169134-36, PPGNPR0169138, PPGNPR0169140-41, PPGNPR0169179, PPGNPR0169186, PPGNPR0169192-93, PPGNPR0169211; Deposition of Chester J. Milczarek, Ultramar Petroleum Inc. and Ultramar America Limited v. PPG Industries Inc. United States District Court of the District of New Jersey, Civil Docket No. 88-4767, 6/12/1989, PPGNPR0067909-92 at PPGNPR0067926-27; Deposition of Robert Widing, Exxon Corp v. PPG Industries, et. al., Docket No. C-001301-90, 1/28/1991, PPGNPR0069717-906 at PPGNPR0069739, PPGNPR0069741-42; Deposition of C.E. von Waaden, Exxon Corp v. PPG Industries, et. al., Superior Court of New Jersey, Hudson County Docket No. W-001301-90, 2/8/1991, PPGNPR0027520-701 at PPGNPR0027570; Deposition of Frederick J. Froehling, Exxon Corp v. PPG Industries, et. al. Docket No. C-001301-90, 2/12/1991, PPGNPR0063393-492 at PPGNPR0063474.

³⁸¹ F. Froehling, Memo re: Renovation of Jersey City Plant, Circa 1957, PPGNPR0063741-43 at PPGNPR0063741.

necessary by the dust problem).”³⁸² Consistent with this advice, no new buildings were constructed at the plant between January 1957 and October 1961.³⁸³

A July 1958 confidential memorandum from the CSCC Works Manager to senior PPGC management discussed worker health issues and recommendations for “any future plant.”³⁸⁴ The memorandum reported that worker compensation costs “since we took over this facility from Natural Products” had gone from over \$31,000 in 1955 to over \$51,000 in 1957 and were anticipated to be \$84,000 in 1958. “You will note a progressive increase in this cost. It should be pointed out that no other item has received any more personal attention and concentrated effort than this one. Every possible effort has been made to hold this down.” The Works Manager added that “[i]n view of current passed or pending legislation upping the benefits and relaxing still further the restrictions on collections it is to be supposed the cost will soon become prohibitive.”³⁸⁵

In November 1959, CSCC and PPG executives worked to authorize construction of a new PPG chromium chemicals manufacturing facility in Corpus Christi, Texas.³⁸⁶ They expected increased sales of those chemicals, and had concluded that “[o]ur Jersey City plant is of insufficient capacity, obsolete, uneconomical, and a health hazard to employees and the community. Corrective action to reduce health hazards to a reasonable level would largely consume profits for several years. . . . The investment required for expansion and modernization or rebuilding of the Jersey City plant cannot be justified economically.”³⁸⁷ They said that in July, 1954, Columbia-Southern acquired the Jersey City chrome chemicals manufacturing facilities of NPRC. “This plant had grown in the past forty years from a small crude operation to its present proportions with apparently little thought given to forward planning.” CSCC had invested a “minimum of new capital . . . to the plant since purchase because of its generally unfavorable location. The manufacturing costs currently are high due to obsolete equipment and techniques and a poor plant layout. The original purchase price of the Jersey City plant plus the new capital added is approximately \$2,100,000; about \$1,750,000 has been recovered through

³⁸² F. Froehling, Memo re: Renovation of Jersey City Plant, Circa 1957, PPGNPR0063741-43 at PPGNPR0063743.

³⁸³ Deposition of Chester J. Milczarek, Jersey City Redevelopment Authority v. PPG Industries Inc. and Internal Fidelity Insurance Company, United States District Court for New Jersey, Docket No. 85-2014 (HLS), 3/27/1987, PPGNPR0067542-683 at PPGNPR0067576.

³⁸⁴ J. Burrell to D. Dailey, Attached Confidential Memo, 7/9/1958, PPGNPR0659871-75 at PPGNPR0659872-73, PPGNPR0659875.

³⁸⁵ J. Burrell to D. Dailey, Attached Confidential Memo, 7/9/1958, PPGNPR0659871-75 at PPGNPR0659873.

³⁸⁶ An August 1959 memorandum indicates that the first weekly progress meeting of the CSCC Corpus Christi chrome chemicals plant project had occurred a few days earlier. D. Mattiza to Those Persons Associated With Bichromate Job, 8/14/1959, PPGNPR0670084-85.

³⁸⁷ S. Hultman to J. Neubauer, 11/27/1959, PPGNPR0032366.

depreciation and earnings since 1954.”³⁸⁸ As a former senior CSCC executive testified in 1989: “Where it says ‘insufficient capacity, obsolete, uneconomic and a health hazard.’ All of them are true. And they knew it from the start.”³⁸⁹

In April 1963, PPG announced that it would be closing the Jersey City plant, at which about 150 were employed, in the near future. This news release also discussed PPG’s new facility in Texas that used new technology in its chromium chemical production processes.³⁹⁰

In 1960, 1962, and finally in 1964, CSCC and PPGC sold the Jersey City plant land and personal property, including what had been purchased from NPRC.³⁹¹

2. Industrial Hygiene and Worker Safety Matters at CSCC

Substantial documentation shows that CSCC acted alone with respect to the chromium hazards that CSCC allowed to persist at the Garfield Avenue plant from mid-1954 through the early 1960s. A longtime NPRC and CSCC executive testified in 1991 that he knew of no federal government inspections of any aspect of the plant during his time there.³⁹²

³⁸⁸ Columbia-Southern Chemical Corporation, 65 TPD Sodium Bichromate Plant for Corpus Christi, Texas with Product Terminal at Jersey City, New Jersey, PPGNPR0032491-506 at PPGNPR0032493. See also Estimated Recovery of Jersey City Investment Based on Terminating Operations January 1, 1962, 12/3/1959, PPGNPR0148773

³⁸⁹ Deposition of Donald Dailey Sr., Ultramar Petroleum Inc v. PPG, United States District Court of New Jersey, C.A. No. 88-4767 (HLS), 6/13/1989, PPGNPR0169107-248 at PPGNPR0169219-22.

³⁹⁰ PPG, Proposed News Release, Jersey City Shutdown, 4/23/1963, PPGNPR0835993.

³⁹¹ Deed, Columbia-Southern Chemical Corporation to Fred Talarico, 3/11/1960, PPGNPR0660050-52; Contract, Pittsburgh Plate Glass Company and Chlorox Company, 6/7/1962, PPGNPR0089939-41; Deed, Pittsburgh Plate Glass Company and Chlorox Company, 7/6/1962, PPGNPR0714614-18; Deed, Pittsburgh Plate Glass Company and Chlorox Company, 7/6/1962, PPGNPR0714126; Deed, NRC and PPG, 7/20/1954, PPGNPR0660383; Plaintiff PPG Industries, Inc.'s Objections and Responses to CGL Defendants' First Set of Joint Interrogatories, PPG Industries Inc. v. Accident and Casualty Insurance Company of Winterthur, et. al., Superior Court of the State of New Jersey, No. HUD-L-1845-95, 6/4/1996, PPGNPR0056686-825; Appendix A, Hudson Valley Chrome Sites, Plaintiff PPG Industries, Inc.'s Objections and Responses to CGL Defendants' First Set of Joint Interrogatories, PPG Industries Inc. v. Accident and Casualty Insurance Company of Winterthur, et. al., Superior Court of the State of New Jersey, No. HUD-L-1845-95, 6/4/1996, PPGNPR0056826-90 at PPGNPR0056830; Real Estate Sales Agreement, PPG to Fred Fishbein, et. al., 7/13/1964, PPGNPR0031904-16; Deed, PPG to Fred Fishbein et. al., 10/12/1964, PPGNPR0714585-92; Statement of Closing, PPG to Fred Fishbein, et. al, 10/14/1964, PPGNPR0036780-82; Statement of Closing, PPG to Fred Fishbein, et. al, 10/14/1964, PPGNPR0660416-18; Pittsburgh Plate Glass Company, 1964 Annual Report, PPGNPR0038650-76 at PPGNPR0038674.

³⁹² Continued Deposition of C.E. von Waaden, Exxon Corp v. PPG Industries, et. al., Superior Court of New Jersey, Hudson County Docket No. W-001301-90, 3/21/1991, PPGNPR0065452-563 at PPGNPR0065545. For documents regarding CSCC’s purchase of equipment for dust removal see, Columbia Southern Chemical Corporation, Authorization for Capital Expenditures, 5/3/1957, PPGNPR0089219; Columbia Southern Chemical Corporation, Board of Directors Meeting, 5/16/1957, PPGNPR00557509-10; Request for Special Repairs, 12/12/1957, PPGNPR0661431; and Estimate of Cost, circa 1957, PPGNPR0670391.

The available information, including the 2015 and 2016 deposition testimony of PPG's corporate representative, shows that—just as was true before CSCC took over operations at the plant—no federal agency had any responsibilities or role between mid-1954 and the end of 1963 with respect to taking actions regarding any of the following matters, among others, at or near the Garfield Avenue plant: Chromium in the storm water runoff from the wastes mounds at the plant; complaints regarding the nuisance chromium dust in the wind from the plant to residential neighboring areas; and internal plant chromium dust abatement and cleanup efforts.³⁹³

For example, a June 1959 CSCC memorandum described actual and contemplated dust control efforts in the Kiln Building (see 10/7/2016 Expert Report of Kristen K. Stout). The wet scrubbers on the gases from those furnaces generated data that indicated “how much dust we were adding to the atmosphere” and produced “a sizeable stack of charts which could be used as a weapon to pacify disgruntled citizens and public officials.”³⁹⁴

In addition, numerous 1954 through 1962 CSCC insurance company and workmen's compensation forms describing claims for injury at CSCC's Jersey City plant due to nasal septum perforation, nasal irritation, nasal ulceration, chrome sores, or contact dermatitis.³⁹⁵

³⁹³ Deposition of Chester J. Milczarek, Jersey City Redevelopment Authority v. PPG Industries inc. and Internal Fidelity Insurance Company, United States District Court for New Jersey, Docket No. 85-2014 (HLS), 3/27/1987, PPGNPR0067542-683 at PPGNPR0067648-49, PPGNPR0067660-61, PPGNPR0067680-81; Continued Deposition of Robert Widing, Exxon Corp v. PPG Industries, et. al., Docket No. C-001301-90, 1/29/1991, PPGNPR0070184-340 at PPGNPR0070220-22; Continued Deposition of Robert Widing, Exxon Corp v. PPG Industries, et. al., Docket No. C-001301-90, 4/19/1991, PPGNPR0070341-447 at PPGNPR0070397-400; C. Milczarek to J. Moore, 4/4/1957, PPGNPR0064426; Dailey to Dunham, 5/3/1957, PPGNPR0075601-602; News Release, D. Dailey, circa 1957, PPGNPR0033310; F. Froehling, Memo re: Renovation of Jersey City Plant, Circa 1957, PPGNPR0063741-43 at 63741; 12/2/1957 Dunham to Dailey; PPGNPR0082652-53; W. Fogelsanger to D. Dailey, 1/24/1958, PPGNPR00664158-62; D. Dunham to D. Dailey, 1/29/1958, PPGNPR00664164; W. Fogelsanger to D. Dunham, 3/25/1958, PPGNPR0082663; Authorization for and Economic Summary of Capital Expenditure, 3/27/1958, PPGNPR0082670; J. Burrell to D. Dailey, 7/9/1958, PPGNPR00659871-75; Deposition of Frederick J. Froehling, Exxon Corp v. PPG Industries, et. al. Docket No. C-001301-90, 2/12/1991, PPGNPR0063393-492 at PPGNPR0063463-65, PPGNPR0063467-69; Continued Deposition of C.E. von Waaden, Exxon Corp v. PPG Industries, et. al., Superior Court of New Jersey, Hudson County Docket No. W-001301-90, 3/21/1991, PPGNPR0065452-563 at PPGNPR0065459, PPGNPR0065532-33, PPGNPR0065471-72; Gouin, “Airborne Hexavalent Chrome (Jersey City Plant) Quarterly Check, 4/30/1957, PPGNPR0033324-28 at 25.

³⁹⁴ W. Fogelsanger to R. Dieter, 6/22/1959, PPGNPR0082685-87 at PPGNPR0082685.

³⁹⁵ State of New Jersey Accident Blank, 3/21/1957 PPGNPR0076755; Employer's Report of Accidental Injury, 12/19/1960, PPGNPR0076758; Employer's Report of Accidental Injury, 1/16/1962, PPGNPR0076764-65; State of New Jersey Accident Blank, 6/1/1956, PPGNPR0076777; State of New Jersey Accident Blank, 6/11/1956, PPGNPR0076780; State of New Jersey Accident Blank, 2/2/1956, PPGNPR0076783; Employer's Report of Accidental Injury, 7/7/1960, PPGNPR0076786-87; State of New Jersey Accident Blank, 1/18/1957, PPGNPR0076819-23; State of New Jersey Accident Blank, 1/9/1956, PPGNPR0076831-32; Employer's Report of Accidental Injury, 11/28/1960, PPGNPR0076834-35; State of New Jersey Accident Blank, 5/4/1955, PPGNPR0076838-39; State of New Jersey Accident Blank, 5/14/1958, PPGNPR0076841; State of New Jersey Accident Blank, 1/9/1956, PPGNPR0076846-47; Employer's Report of Accidental Injury, 1/26/1959, PPGNPR0076849-50; State of New Jersey Accident Blank, 2/21/1956, PPGNPR0076853; State of New Jersey

In the mid and late 1950s, and in the early 1960s, NPRC and other industry members commissioned confidential studies to study the chromium concentrations in the air at their plants, and worker safety and the health problems associated with worker exposure to chromium including lung cancer, nasal perforations, and skin ulcers. The secrecy of these studies and the fact that the Federal government was unaware of their existence until this litigation underscores that no one believed that the federal government had any responsibility for or need to know about these matters at any chromate chemical industry plants, including the Garfield Avenue plant.

Nothing indicates that any of the following reports and other documents were provided to any agency of the United States. In fact, several expressly prohibited dissemination of them to anyone other than industry members.

Accident Blank, 9/27/1956, PPGNPR0076856; State of New Jersey Accident Blank, 11/26/1956, PPGNPR0076859; State of New Jersey Accident Blank, 11/26/1956, PPGNPR0076862; State of New Jersey Accident Blank, 1/13/1956, PPGNPR0076865; Employer's Report of Accidental Injury, 1/16/1959, PPGNPR0076866-67; State of New Jersey Accident Blank, 2/7/1956, PPGNPR0076870-71; Employer's Report of Accidental Injury, 6/24/1960, PPGNPR0076889-90; Employer's Report of Accidental Injury, 12/6/1962, PPGNPR0076903-04; Employer's Report of Accidental Injury, 12/9/1959, PPGNPR0076908-09; Standard Form for Surgeons Report, 10/18/1960, PPGNPR0076912-13; Employer's Report of Accidental Injury, 10/19/1960, PPGNPR0076914-15; Employer's Report of Accidental Injury, 12/6/1962, PPGNPR0076916-17; Employer's Report of Accidental Injury, 5/15/1959, PPGNPR0076923-24; Employer's Report of Accidental Injury, 8/28/1962, PPGNPR0076927; State of New Jersey Accident Blank, 3/20/1957, PPGNPR0076932; State of New Jersey Accident Blank, 6/14/1957, PPGNPR0076936-40; State of New Jersey Accident Blank, 8/5/1957, PPGNPR0076944; State of New Jersey Accident Blank, 5/14/1957, PPGNPR0076947; State of New Jersey Accident Blank, 4/25/1957, PPGNPR0076950-51; State of New Jersey Accident Blank, 5/21/1958, PPGNPR0076956-57; Employer's Report of Accidental Injury, 7/25/1961, PPGNPR0076962-63; State of New Jersey Accident Blank, 2/24/1956, PPGNPR0076966-67; State of New Jersey Accident Blank, 11/11/1955, PPGNPR0076971-72; State of New Jersey Accident Blank, 5/15/1957, PPGNPR0076978; State of New Jersey Accident Blank, 11/2/1956, PPGNPR0077010; State of New Jersey Accident Blank, 12/21/1956, PPGNPR0077013; State of New Jersey Accident Blank, 11/29/1956, PPGNPR0077022; State of New Jersey Accident Blank, 2/7/1956, PPGNPR0077023-24; State of New Jersey Accident Blank, 7/2/1957, PPGNPR0077026; State of New Jersey Accident Blank, 11/14/1955, PPGNPR0077038-39; State of New Jersey Accident Blank, 7/16/1957, PPGNPR0077043-46; State of New Jersey Accident Blank, 11/12/1956, PPGNPR0077049; State of New Jersey Accident Blank, 11/22/1955, PPGNPR0077052; State of New Jersey Accident Blank, 8/8/1957, PPGNPR0077056-57; State of New Jersey Accident Blank, 5/28/1956, PPGNPR0077060-61; State of New Jersey Accident Blank, 5/15/1957, PPGNPR0077069; State of New Jersey Accident Blank, 11/2/1956, PPGNPR0077083-84; State of New Jersey Accident Blank, 9/4/1957, PPGNPR0077095-96; Employer's Report of Accidental Injury, 3/13/1961, PPGNPR0077099; State of New Jersey Accident Blank, 12/27/1956, PPGNPR0077105; State of New Jersey Accident Blank, 12/31/1957, PPGNPR0077108; State of New Jersey Accident Blank, 1/26/1956, PPGNPR0077111-12; State of New Jersey Accident Blank, 3/9/1956, PPGNPR0077116-17. Also see, CSCC, Supervisors's Report of Accident Investigation, 9/10/1962, PPGNPR0557473-87.

An October 1954 Industrial Hygiene Foundation (IHFA)³⁹⁶ report – “Control of Health Hazards, Jersey City Plant, CSCC” – described a preliminary survey in late September 1954 that arose from the “recognition of the potential health hazards associated with the processing of chrome ore and in the production of various chromium compounds (nasal perforations, skin ulcers, lung cancer),” and the desire “to initiate and maintain a control program which will eliminate, so far as possible, all specific hazards.”³⁹⁷ The report was the result of plant inspections and discussions with R.E. Widing, Works Manager; John Michaelis, Maintenance and Engineering Consultant; L. R. Papp, Production Superintendent; T.R. Donoghue, Safety Director; and C.C. Ruddick, Assistant Safety Director.³⁹⁸ The IHFA report that atmospheric chromate concentrations varied “widely,” (from less than 0.01 mg/m³ to 3-4 mg/m³). “Average concentrations in the several departments ranged above and below 0.1 mg/m³ CrO₃, which is commonly used as a hygienic standard for exposure to chromium compounds. Thus, it is clear that a potential hazard exists in the plant and that further control measures are needed” in a number of specific operations.³⁹⁹ Some measures were “essentially . . . engineering and maintenance problem[s],” while others were “a responsibility of the production department and must become an established and routine part of plant operation.”⁴⁰⁰

A March 1955 CSCC report described a conference by PPG personnel with medical and industrial hygiene personnel of the Bayer Co. in Germany was distributed to PPG and CSCC executives R.L. Hutchison, J.A. Neubauer, T.R. Donoghue, C. Fuchsman, D. Duncan, and R.E. Widing. The report stated that “[i]ndustrial diseases associated with the production and use of

³⁹⁶ The IHFA was a private organization composed of business interests and trade associations. The IHFA was founded in 1935 as the Air Hygiene Foundation. The name was changed to IHFA in 1941. “Only private industrial institutions and trade associations” were allowed membership. National Academy of Sciences, National Research Council and National Research Council, Canada, *Scientific and Technical Societies of the United States and Canada* (Washington, DC: National Academy of Sciences—National Research Council, 1961), p. 219. In September 1994 answers to interrogatories in other litigation, PPG stated that it had been a member of or affiliated with the IHFA or its predecessor organizations from 1939 to the present. Answers to Interrogatories, First Set, Gertrude Settle v. PPG Industries et. al., Superior Court of New Jersey, Docket No. HUDL10654-92, 9/13/1994, PPGNPR0056394-437 at PPGNPR0056397.

³⁹⁷ Industrial Hygiene Foundation of America, Inc., “Control of Health Hazards, Jersey City Plant, Columbia-Southern Chemical Corporation (Pittsburgh Plate Glass), Preliminary Survey,” 9/29/1954, PPGNPR0033303-09 at PPGNPR0033304.

³⁹⁸ Industrial Hygiene Foundation of America, Inc., “Control of Health Hazards, Jersey City Plant, Columbia-Southern Chemical Corporation (Pittsburgh Plate Glass), Preliminary Survey,” 9/29/1954, PPGNPR0033303-09 at PPGNPR0033304.

³⁹⁹ Industrial Hygiene Foundation of America, Inc., “Control of Health Hazards, Jersey City Plant, Columbia-Southern Chemical Corporation (Pittsburgh Plate Glass), Preliminary Survey,” 9/29/1954, PPGNPR0033303-09 at PPGNPR0033305-307.

⁴⁰⁰ Industrial Hygiene Foundation of America, Inc., “Control of Health Hazards, Jersey City Plant, Columbia-Southern Chemical Corporation (Pittsburgh Plate Glass), Preliminary Survey,” 9/29/1954, PPGNPR0033303-09 at PPGNPR0033308. *See also* March 14, 1955 report, Industrial Hygiene Foundation of America, Inc., “Airborne Hexavalent Chromium Concentrations in the CSCC Plant, Jersey City, New Jersey,” PPGNPR0032067-126; 3/22/55 letter from the IHFA to PPGC’s Thomas R. Donoghue, PPGNPR0037190-91;

hexavalent chromium compounds are of four types: 1. Perforation of the Nasal septum; 2. Lung cancer (carcinoma); 3. Inflammation of the nasal sinuses; [and] 4. Skin ulceration.”⁴⁰¹ At the Bayer plant, the most recent examination of all 81 bichromate plant personnel showed that 36 were normal; 11 had skin ulcers; and 34 had nasal septum perforations.⁴⁰² “Lung cancer attributable to bichromate exposure may occur many years after such exposure has ceased. The establishment of Cr as the causative agent results from the detection of Cr in the diseased lung tissue.”⁴⁰³

A circa 1956 IHFA Prospectus for a Medical Survey for the Primary Chromium Chemical Producers discussed the known biologic effects of chromium compounds. “Certain penetrating ulcers of the skin, referred to as ‘chrome sores’ or ‘chrome holes’, have been recognized for over a hundred years, as has a characteristic perforation of the septum of the nose. . . . In the past 20 or 25 years, data have been accumulated which are interpreted as showing a correlation between cancer of the lung and exposure to some chromium compounds. The earliest reports omitted important information and involved numbers too small for definite conclusions. However, a study conducted in 1948 indicated that the death rate for cancer of the lung among chromium workers was nearly 25 times the expected rate, and several more recent studies have tended to confirm the correlation.”⁴⁰⁴

With a December 1956 letter from PPG’s Thomas R. Donoghue, Manager – Safety and Plant Protection to the Director, Industrial Hygiene Division of the Lumberman’s Mutual Insurance Co., Donoghue enclosed a copy of the Industrial Hygiene Foundation survey report of our Jersey City plant, as the latter had requested. “I know you will keep this confidential.” Donoghue continued: “As regards Jersey City, your man was to make a survey, taking dust counts and vapor concentrations in various areas and I am wondering if he has completed his study as yet. I know we are having some difficulty at Jersey City on claims due to increased sizes of perforations and no doubt you will be concerned as to the payments being made on these costs. I know that we are.” “If you have any suggestions or recommendations on safety or hygiene at Jersey City, would be glad to have you so advise.”⁴⁰⁵

On December 7, 1956, CSCC, Diamond Alkali Co., and the Mutual Chemical Division of Allied Chemical & Dye Corp. (collectively “Sponsors”) entered into an “Agreement with the

⁴⁰¹ Report on Conference with Medical Staff, Bayer Co., Leverkusen, German, 3/10/1955, PPGNPR0071006-09 at PPGNPR0071007.

⁴⁰² Report on Conference with Medical Staff, Bayer Co., Leverkusen, German, 3/10/1955, PPGNPR0071006-09 at PPGNPR0071007.

⁴⁰³ Report on Conference with Medical Staff, Bayer Co., Leverkusen, German, 3/10/1955, PPGNPR0071006-09 at PPGNPR0071008.

⁴⁰⁴ Prospectus of Medical Survey for the Primary Chromium Chemicals Producers, IHFA, circa 1956, PPGNPR0836347-52 at 48. (emphasis original).

⁴⁰⁵ T. Donaghan to H. Walworth, 12/6/1956, PPGNPR0070783.

IHFA ("Researcher") in part because the "primary chromium chemical producers . . . are faced with a common serious health problem." The agreement called for the Foundation to study and research the "actual incidence of certain pathological conditions associated in the past with exposure to chromium compounds; a statistical evaluation of such association, if it exists; and the development of practical information regarding prevention of those conditions which may be found to have such association."⁴⁰⁶

This December 1956 Agreement with the IHFA provided in part that the Sponsors would not refer to the Researcher in any advertising, promotional, or publicity materials "nor shall RESEARCHER publish or make known to others the subject matter of or results obtained in said PROJECT without approval in writing from the SPONSORS."⁴⁰⁷ It further stated that "SPONSORS covenant that they shall give such approval for making known the subject matter of or results obtained in said PROJECT to other primary chromium chemical producers in the United States, who request the same and who join in the PROJECT as SPONSORS." Furthermore, any "papers prepared for private distribution or for publication in a scientific journal based upon the research conducted pursuant to this agreement shall be submitted to the SPONSORS for review and comment prior to the release thereof, and shall not be distributed or published without the SPONSORS' written consent. The RESEARCHER further covenants and agrees that all information in respect to products, processes, employees and plant experience submitted to it by the SPONSORS for and in aid of the PROJECT, as well as the SPONSORS' interest and sponsorship thereof, shall be held confidential and it shall use every effort to withhold such information amid records thereof from the knowledge of its employees, except those directly engaged in the PROJECT."⁴⁰⁸

The result of this December 1956 Agreement was the IHFA December 1957 report - "Epidemiological Study of Environment and Health of Chromate Workers," copies of which were marked as "Restricted" and numbered, as well as "Confidential."⁴⁰⁹ "The present study was commissioned by the Primary Chromium Chemical Producers in an attempt to reevaluate the effects of the environment on health and to determine the actual incidence of certain pathological conditions which had been associated in the past with exposure to chromium

⁴⁰⁶ Agreement between Mutual Chemical Division, Allied Chemical and Dye Corporation, Columbia-Southern Chemical Corporation, and Diamond Alkali ("Sponsors") and Industrial Hygiene Foundation of America, Inc. ("Researcher"), 12/7/1956, PPGNPR0037152-57 at PPGNPR0037152.

⁴⁰⁷ Agreement between Mutual Chemical Division, Allied Chemical and Dye Corporation, Columbia-Southern Chemical Corporation, and Diamond Alkali ("Sponsors") and Industrial Hygiene Foundation of America, Inc. ("Researcher"), 12/7/1956, PPGNPR0037152-57 at PPGNPR0037154.

⁴⁰⁸ Agreement between Mutual Chemical Division, Allied Chemical and Dye Corporation, Columbia-Southern Chemical Corporation, and Diamond Alkali ("Sponsors") and Industrial Hygiene Foundation of America, Inc. ("Researcher"), 12/7/1956, PPGNPR0037152-57 at PPGNPR0037154-55.

⁴⁰⁹ IHFA, An Epidemiological Study of Environment and Health of Chromate Workers, Dec. 1957, PPGNPR0032127-96. Emphasis original.

compounds. If such an association were shown to exist, the industry requested a statistical evaluation thereof and, if possible, the development of practical information regarding prevention of those conditions which may be found to have such an association.”⁴¹⁰ The report acknowledged those who had assisted in the collection of relevant data, including Louis Papp of the CSCC.⁴¹¹

The December 1957 IHFA report stated that the lung cancer death rates for the chromate workers in the study were computed on the basis of “proved” deaths due to occupational exposures and “total” (including “suspected”) deaths, “and these rates are obviously quite high.”⁴¹² Of the 212 workers in the study cohort who had died by 1956, 53 were proven to have died from lung cancer and 11 were suspected of having died from that disease.⁴¹³ This data yielded a rate of 687 per 100,000 man-years of risk for proven lung cancer deaths, and a rate of 832 per 100,000 man-years of risk for total lung cancer deaths.⁴¹⁴ By comparison, the total lung cancer death rate per 100,000 adult males in the general United States population for 1952 was 35 per 100,000 man-years of risk.⁴¹⁵ The report emphasized that the rates calculated for the chromate workers “[we]re minimum rates, being based on the known lung cancer deaths and on a total cohort of 1107 men.” This, of course, included 333 persons who had been “lost” and were therefore “unaccounted for,” “among whom there could very likely be additional lung cancer deaths” not included in the data.⁴¹⁶ The study authors had assumed, however, “that none of those lost had died of lung cancer, and to calculate the mortality on the basis of the observed deaths and the total cohort. The mortality rate developed is, hence, a minimal rate and should be considered as meaning that ‘at least’ such and such a rate prevails per unit population of chromate workers.” The overall rate for chromate workers, therefore, was about 12.5 to 14 times that for adult males in the US.⁴¹⁷

⁴¹⁰ IHFA, An Epidemiological Study of Environment and Health of Chromate Workers, Dec. 1957, PPGNPR0032127-96 at PPGNPR0032133-34.

⁴¹¹ IHFA, An Epidemiological Study of Environment and Health of Chromate Workers, Dec. 1957, PPGNPR0032127-96 at PPGNPR0032130.

⁴¹² IHFA, An Epidemiological Study of Environment and Health of Chromate Workers, Dec. 1957, PPGNPR0032127-96 at PPGNPR0032150.

⁴¹³ IHFA, An Epidemiological Study of Environment and Health of Chromate Workers, Dec. 1957, PPGNPR0032127-96 at PPGNPR0032147.

⁴¹⁴ IHFA, An Epidemiological Study of Environment and Health of Chromate Workers, Dec. 1957, PPGNPR0032127-96 at PPGNPR0032151, PPGNPR0032162-64.

⁴¹⁵ IHFA, An Epidemiological Study of Environment and Health of Chromate Workers, Dec. 1957, PPGNPR0032127-96 at PPGNPR0032153-54.

⁴¹⁶ IHFA, An Epidemiological Study of Environment and Health of Chromate Workers, Dec. 1957, PPGNPR0032127-96 at PPGNPR0032149; PPGNPR0032154-55. Emphasis in original.

⁴¹⁷ IHFA, An Epidemiological Study of Environment and Health of Chromate Workers, Dec. 1957, PPGNPR0032127-96 at PPGNPR0032169. Emphasis in original.

The IHFA submitted a circa 1958 Supplemental Report to CSCC relating to those personnel from the Jersey City plant included in the larger cohort discussed in the December 1957 IHFA report.⁴¹⁸ Of the 140 men from CSCC, six could not be accounted for and were considered “lost,” leaving a net cohort of 134 for this plant.⁴¹⁹ Of this number, 47 had died by 1956. Eleven of these deaths were from lung cancer, with three more from “Questionable” lung cancer. This supplemental report concluded that the CSCC “death rate in all [age group] categories [was] considerably above the industry rate in all categories” except for a person for whom an age was unknown, and were also “in excess of the industry average” in most length of employment categories.⁴²⁰ The CSCC lung cancer rate was therefore 910 per 100,000 for the “Total” of 14 lung cancer deaths, and the lung cancer rate per 100,000 for the 11 “Proved” deaths was 715.⁴²¹ The plant therefore provided almost 13 percent of the cohort for the industry-wide study, but a “disproportionate” 22 percent of the total lung cancer cases.⁴²²

As CSCC, Diamond Alkali Co., and Allied Chemical Corp. had in December 1956, they entered into a similar January 26, 1959 Agreement with the IHFA (“Researcher”) again in part because the “primary chromium chemical producers . . . are faced with a common serious health problem.”⁴²³ Like the December 1956 Agreement, this agreement called for the IHFA to study and research the “actual incidence of certain pathological conditions associated in the past with exposure to chromium compounds; a statistical evaluation of such association, if it exists; and

⁴¹⁸ IHFA, Supplemental Report to Columbia-Southern Chemical Corporation, Subsidiary of Pittsburgh Plate Glass Company, Jersey City, New Jersey on Epidemiological Study of Chromate Workers, n.d., PPGNPR0032197-203.

⁴¹⁹ IHFA, Supplemental Report to Columbia-Southern Chemical Corporation, Subsidiary of Pittsburgh Plate Glass Company, Jersey City, New Jersey on Epidemiological Study of Chromate Workers, n.d., PPGNPR0032197-203 at PPGNPR0032197.

⁴²⁰ IHFA, Supplemental Report to Columbia-Southern Chemical Corporation, Subsidiary of Pittsburgh Plate Glass Company, Jersey City, New Jersey on Epidemiological Study of Chromate Workers, n.d., PPGNPR0032197-203 at PPGNPR0032200.

⁴²¹ IHFA, Supplemental Report to Columbia-Southern Chemical Corporation, Subsidiary of Pittsburgh Plate Glass Company, Jersey City, New Jersey on Epidemiological Study of Chromate Workers, n.d., PPGNPR0032197-203 at PPGNPR0032201.

⁴²² IHFA, Supplemental Report to Columbia-Southern Chemical Corporation, Subsidiary of Pittsburgh Plate Glass Company, Jersey City, New Jersey on Epidemiological Study of Chromate Workers, n.d., PPGNPR0032197-203 at PPGNPR0032202. A February 1958 CSCC memorandum to a senior PPG executive forwarded copies of the completed IHF survey that had been requested by another PPG executive. The CSCC executive suggested to the second that he “clear this” with the senior PPG executive, “since our co-sponsors would be very unhappy if they thought we were too free with the information contained.” D. Dailey to R. Hutchison, 2/3/1958, PPGNPR0181664.

⁴²³ Agreement between Mutual Chemical Division, Allied Chemical and Dye Corporation, Columbia-Southern Chemical Corporation, and Diamond Alkali (“Sponsors”) and Industrial Hygiene Foundation of America, Inc. (“Researcher”), 1/26/1959, PPGNPR0075243-56 at PPGNPR0075243.

the development of practical Information regarding prevention of those conditions which may be found to have such association.”⁴²⁴

Also like the December 1956 Agreement, the parties agreed that “no advertising, promotional or publicity matter containing any reference to the RESEARCHER or to any of its employees shall be made use of by the SPONSORS or anyone in the SPONSORS’ behalf, unless and until the same shall have first been submitted to and received the approval in writing of the RESEARCHER, nor shall the RESEARCHER publish or make known to others the subject matter of or results obtained in said WORK without approval in writing from each of the SPONSORS. All papers prepared for private distribution or for publication in a scientific journal based upon the researches conducted pursuant to this Agreement shall be submitted to the SPONSORS for review and comment prior to release thereof and shall not be distributed or published without the SPONSORS’ written consent. The RESEARCHER further covenants and agrees that all information in respect to products, processes, employees and plant experience submitted to it by the SPONSORS for and in aid of the WORK, as well as the SPONSORS’ interest and sponsorship thereof, shall be held confidential and RESEARCHER shall use every effort to withhold such information and records thereof from the knowledge of its employees, except those directly engaged in the WORK.”⁴²⁵ However, PPG has not produced in this litigation any study report that the IHFA prepared pursuant to this January 1959 agreement. The available evidence does not reveal why.

Between 1957 and 1962, CSCC conducted and directed many other sampling surveys for airborne hexavalent chromium throughout the Garfield Avenue plant. The reports from these surveys showed continued dangerous and often deteriorating conditions. Distribution of copies of the reports was limited to CSCC and consultant personnel.⁴²⁶

⁴²⁴ Agreement between Mutual Chemical Division, Allied Chemical and Dye Corporation, Columbia-Southern Chemical Corporation, and Diamond Alkali (“Sponsors”) and Industrial Hygiene Foundation of America, Inc. (“Researcher”), 1/26/1959, PPGNPR0075243-56 at PPGNPR0075243.

⁴²⁵ Agreement between Mutual Chemical Division, Allied Chemical and Dye Corporation, Columbia-Southern Chemical Corporation, and Diamond Alkali (“Sponsors”) and Industrial Hygiene Foundation of America, Inc. (“Researcher”), 1/26/1959, PPGNPR0075243-56 at PPGNPR0075247-48.

⁴²⁶ Gouin, Report I, Airborne Hexavalent Chrome (Jersey City Plant), 1/10/1957, PPGNPR0064461-66; Donoghue to Walworth, 12/6/1956, PPGNPR0836193; Laubly to Dailey, 3/27/1957, PPGNPR0032592; Laubly to Dailey, 3/27/1957, PPGNPR0068255; and Report of an Industrial Hygiene Study, Columbia Southern Chemical Company, Jersey City, New Jersey, PPGNPR0068256-71; C. Milczarek, Sampling of Atmosphere for Hexavalent Chromium Dust Concentration, 4/12/1957, PPGNPR0032358-64; Gouin, Airborne Hexavalent Chrome (Jersey City Plant) Quarterly Check, 4/30/1957, PPGNPR0033324-28; Dailey to Dunham, 5/3/1957, PPGNPR0075601-02; Gouin, Atmospheric Sampling, JCRD #75, 5/14/1957, PPGNPR0036748-54; Gouin, Memo on Progress Study of Lung Cancer in Chromate Industry, 11/25/1957, PPGNPR0064270-76; J. LaPallo, Airborne Hexavalent Chrome (Jersey City Plant), 12/4/1957, PPGNPR0181949-52; J. LaPallo, Airborne Hexavalent Chrome (Jersey City Plant) Quarterly Survey, 3/18/1959, PPGNPR0082658-60; J. LaPallo, Airborne Hexavalent Chrome (Jersey City Plant), 4/30/1958, PPGNPR0032604-08; J. LaPallo, Airborne Hexavalent Chrome (Jersey City Plant), 7/3/1958, PPGNPR0032609-12; J. LaPallo, Airborne Hexavalent Chrome (Jersey City Plant), 5/15/1959, PPGNPR0065880-83; J. LaPallo, Airborne Hexavalent Chrome (Jersey City Plant), 9/24/1959, PPGNPR0181944-48; J. LaPallo, Airborne Hexavalent Chrome (Jersey City Plant), 6/1/1960, PPGNPR0181940-43; J. Kaplan, Airborne Hexavalent Chrome (Jersey City

D. Conclusions Relating to NPRC and CSCC from 1946-1963

No documents found indicate that between 1946 and 1963 anyone employed by an agency of the United States ever issued or gave orders, instructions, or directions to NPRC or CSCC directors, officers, managers, executives, supervisors, or hourly workers concerning how, when, or where to perform steps in the chromite processing or chromium chemical manufacturing processes at the Garfield Avenue plant.

No documents found indicate that during World War II anyone employed by an agency of the United States ever issued or gave any orders or instructions to NPRC or CSCC workers regarding how, when, or where to handle, manage, or dispose of residues, sludges, or wastes generated during chromite processing or chromium chemical manufacturing processes at the NRC plant.

No documents found indicate that any employee or representative of any agency of the United States resided at, visited, inspected, or performed duties or responsibilities at the Garfield Avenue plant between 1946 and 1963.

There is no documentation showing that any agency of the Federal Government took any actions between the end of World War II and the beginning of the Korean War that impacted the ownership of NRC, NRC's production of sodium bichromate, or the company's handling of waste.

No documents found indicate that at any time after 1945 any agency of the United States ever purchased, or held title to or an ownership interest in, any residues, sludges, or wastes generated at any time during chromite processing or chromium chemical manufacturing operations at the plant.

No documents reviewed indicate that any agency of the United States ever owned any of the buildings, machinery, equipment, other facilities, or land at or near the Garfield Avenue plant between 1946 and 1963.

No documents found indicate that during or at any time after World War II NRC ever requested that an agency of the United States remove from the plant or any other location any residues, sludges, or wastes that were ever generated during chromite processing or chromium chemical manufacturing operations at the NRC plant.

Plant), 9/6/1962, PPGNPR0662200-205; New York Stock Exchange, Department of Stock List, Pittsburgh Plate Glass Company, 7/15/1954, PPGNPR0089439-49 at PPGNPR0089439; Industrial Hygiene Foundation of America, Inc., "Control of Health Hazards, Jersey City Plant, Columbia-Southern Chemical Corporation (Pittsburgh Plate Glass), Preliminary Survey, 9/29/1954, PPGNPR0033303-09; Preliminary Report on Airborne Concentrations of Hexavalent Chromium Compounds in the Columbia Southern Plant, Jersey City, New Jersey, 11/30-12/17/1954, PPGNPR032508-19; Skeffington to Froehling, 4/9/1956, PPGNPR0557491-93 at PPGNPR0557492. Also see PPG, Monthly Summary of D.O. Complaints and Claims, July-December 1958, PGNPR0077284-95.

The Government never issued any kind of approval or disapproval of any of NPRC's or CSCC's waste management or disposal practices, nor is there evidence to indicate that the Government had authority to do so. Similarly, the Government did not issue any approval or disapproval of any of NPRC's or CSCC's plant worker safety or industrial hygiene practices, nor is there evidence to indicate that the Government had authority to do so.

There is no documentation indicating that NPRC applied for a tax amortization certificate or otherwise sought financial assistance from the Federal Government during the Korean War.

There is no documentation showing that an agency of the Federal Government assisted NPRC in the recruitment or hiring of workers during the Korean War.

There is no documentation showing that an agency of the Federal Government allocated chemical grade chromite during the Korean War period or any evidence suggesting NPRC wanted to have such ore allocated during the Korean War.

There is no documentation showing that an agency of the Federal Government took any action that impacted the ownership of NPRC, NPRC's production of sodium bichromate, or the company's handling of waste during the Korean War.

No documents found indicate that any agency of the United States sold, delivered, or used any volatile organic compounds (including but not limited to trichloroethylene and tetrachloroethylene), semi-volatile organic compounds, polychlorinated biphenyls, polycyclic aromatic hydrocarbons, benzene, toluene, ethylbenzene, xylene, or acids, used, consumed or released at the Garfield Avenue plant or other relevant site in this case.

There is no documentation showing that an agency of the Federal Government took any action that impacted the ownership of National Products Refining, Columbia-Southern, or PPG, in any of the three companies' production of sodium bichromate, or impacted any of the three companies' handling of waste during the Korean War at the Garfield Avenue plant in Jersey City, NJ.

The Government never seized or threatened the seizure or take-over of the Garfield Avenue plant at any time between 1946 and 1964 for any reason.

BRIGHAM

ATTACHMENT 1



JAY L. BRIGHAM, PH.D., MANAGING PARTNER

Morgan, Angel & Associates, LLC
1601 Connecticut Avenue, NW, Suite 600
Washington, DC 20009
P 202-265-1833, ext. 113 • F 202-265-8022
jay@morganangel.com • www.morganangel.com

EDUCATION

Ph.D., American History, The University of California, Riverside, CA, 1992
M.A., American History, The University of Maryland, College Park, MD, 1986
B.A., American History, Linfield College, McMinnville, OR, 1982

CAREER SUMMARY

After receiving his Ph.D. from the University of California, Riverside (UCR), Dr. Brigham taught at UCR; the University of Nevada, Las Vegas; and Arizona State University. His areas of expertise include American Political History, the American West, and Environmental History. The University of Kansas published his book on the public power movement *Empowering the West: Electrical Politics Before FDR*, in 1998. Dr. Brigham has also authored several articles, written book reviews, and delivered presentations on the history of energy, the West, and the environment. He has authored expert witness reports that examined public policy issues during World War II and the Korean War, energy issues, mining cases, U.S. Army Corps of Engineer dredging, and Takings cases for the U.S. Department of Justice and for private law firms. Dr. Brigham has given expert testimony in U.S. District Courts and the U.S. Court of Federal Claims and is presently serving as an expert witness on several superfund cases involving issues dating from World War II through the Cold War and a number of cases involving Native Americans.

PROFESSIONAL EXPERIENCE

Morgan, Angel & Associates, LLC, Washington, DC

Managing Partner, 2014-present
Partner, 2009-2013
Senior Research Associate, 2000-2008
Research Associate, 1997-1999

Arizona State University, Tempe, AZ

Senior Visiting Lecturer, 1996-1997

University of Nevada, Las Vegas, NV

Visiting Assistant Professor, 1995-1996

University of California, Riverside, CA
Visiting Assistant Professor, 1992-1995

EXPERT WITNESS EXPERIENCE

Retained by the United States Department of Justice in the following:

Chevron Oil Company World War II Aviation Gasoline Production Discussions.

United States of America and State of Wisconsin v. NCR Corp. et al., 10-CV-91-WCG
(E.D. WI.).

Gowanus Canal Superfund Site (E.D. NY).

Cranbury Brick Yard, LLC v. United States of America, et al., 3:15-CV-02789-PGS-LHG
(D. of NJ.).

Electric Boat Corporation v. United States of America, Civil Action No. 15-461 (D. of
RI.)

*United Nuclear Corporation, El Paso Natural Gas Company, L.L.C., and Homestake
Mining Company of California v. United States of America*, 1:15-CV-411 (D. of NM.).

Honeywell International, Inc. Onondaga Lake Superfund Site Mediation.

*United States of America and California Department of Toxic Substances Control v.
Sterling Centrecorp, Inc., Stephen P. Elder, and Elder Development, Inc.*, 2:08-CV-
02556-MCD-JFM (E.D. CA., Sacramento Division).

LCP Chemicals Superfund Sites Mediation.

Atlantic Richfield Company v. United States of America, et al., 1:1CV-56 (D. of NM.).

Shell Oil Company v. United States of America, 06-141C (CFC). Deposition and trial
testimony were given in this case.

An Expert Witness Rebuttal Report Regarding 100-Octane Aviation Gasoline in
the Southern California Refineries Owned by the Shell Oil Company; the Atlantic
Richfield Company; Texaco, Inc.; and Union Oil Company during World War II.

An Expert Witness Report Regarding 100-Octane Aviation Gasoline in the
Southern California Refineries Owned by the Shell Oil Company; the Atlantic
Richfield Company; Texaco, Inc.; and Union Oil Company during World War II.

Regarding Former Vanadium Corporation of America and Climax Uranium Company
Mines on the Navajo Reservation.

El Paso Natural Gas Company, L.L.C. v. United States of America, et al., 3:14-CV-8165 (D. AZ.).

Boeing Mediations at the Former Long Beach Site and the former Wichita Site.

Navajo Nation Abandoned Uranium Mines Discussions.

F.E.B. Corps v. United States of America, Case No.: 12-10072-CV-Martinez (S.D. FL.).

A Report on The Political Controversy Leading to the Passage of the Submerged Lands Act.

Grace Goodeagle v. United States of America, 12-431L (CFC).

Quapaw Tribe of Oklahoma (O-Gah-Pah) v United States of America, 12-592L (CFC).

T.C. Bear v. United States of America, Congressional Reference No. 13-cg-00051X (CFC).

Deposition testimony was given in the *Goodeagle*, *Quapaw*, and *Bear* cases.

PPG Industries, Inc., v. United States of America, 2:12-CV-0352(KM)(MF) (D. of NJ.).
30(b)(6) testimony was given in this case.

United States of America v. Federal Resources Corporation, 2:11-CV-000127-BLW (D. of ID.). Deposition testimony was given in this case.

A Report on the Defense Minerals Exploration Administration Contracts for the Conjecture Mine and the Minnie Moore Mine.

Lockheed Martin Corporation v. United States of America, 06-1438-RJL (D. of DC.).

A Rebuttal Report.

A Report on the Lockheed Martin Facility at Great Neck, New York (Plancor 146) Formerly Owned by the Sperry Gyroscope Company.

Exxon Mobil Corporation v. United States of America, 4:11-CV-1914 (D. LA.).

Exxon Mobil Corporation v. United States of America, H:10-2386 (S.D. TX., Houston Division).

Exxon Mobil Corporation v. United States of America, (S.D. TX. C. A. Nos. H-10-2386 and H-11-1844) and (Fed. Cl. Nos. 09-165C and 09-0882C).

Deposition testimony was given in the above three Exxon Mobil cases.

A Rebuttal and Supplemental Report Regarding the ExxonMobil Facility at Baytown, Texas Formerly Owned by the Humble Oil and Refining Company and the Facility at Baton Rouge, Louisiana Formerly Owned by the Standard Oil Company of Louisiana during World War II.

A Rebuttal Report Regarding the ExxonMobil Facility at Baytown, Texas Formerly Owned by the Humble Oil and Refining Company and the Facility at Baton Rouge, Louisiana Formerly Owned by the Standard Oil of Louisiana, From the World War II Era through the Korean War.

A Report Regarding the ExxonMobil Facility at Baytown, Texas Formerly Owned by the Humble Oil and Refining Company and the Facility at Baton Rouge, Louisiana Formerly Owned by the Standard Oil of Louisiana, From the World War II Era through the Korean War.

Mediation involving National Fireworks (Cordova, TN plant).

United States of America v. Washington State Department of Transportation, 3:08-CV-05722-RJB (W.D. WA.). Deposition and trial testimony were given in this case.

A Report on the Army Corps of Engineers and City Waterway, Tacoma Harbor, Washington: 1900-1950.

Texas Instruments Incorporated, f/k/a Metals and Controls Corp., M&C Nuclear, Inc. v United States of America, 09-701 (CFC).

AVX Corporation v. Horry Land Company, Inc., and United States of America, 4:07-CV-3299-TLW-TER (D. S.C. Florence Division). Deposition and trial testimony were given in this case.

A Report on the Myrtle Beach Army Air Field, 1941-1955.

Appleton Papers, Inc. and NCR Corporation v. George Whiting Paper Company, et al., 08-CV-00016-WCG (Consolidated with 08-CV-0895) (E.D. WI.). Deposition testimony was given in this case.

A Report on the Environmental Protection Agency's Recycling Program and the Recycling of Carbonless Paper.

City of Fresno v. United States of America, et al., 1:06-CV-01559-OW-LJO (E.D. CA.). Deposition testimony was given in this case.

A Report on Hammer Army Air Field, 1940-1948.

American International Specialty Lines Insurance Company v. United States of America, CV06-4686 AHM (RZx), (C.D. CA.). Deposition and trial testimony were given in this case.

A Rebuttal Report.

A Report on the Whittaker-Bermite Company.

Litgo New Jersey, Inc., et al. v. Mauriello, 06-2891 (AET) (TB) (D. N.J.). Deposition and trial testimony were given in this case.

A Supplemental Report on Columbia Aircraft Products, Incorporated, Somerville, NJ: 1940-1947.

A Report on Columbia Aircraft Products, Incorporated, Somerville, NJ: 1940-1947.

Seminole Nation of Oklahoma v. Salazar, et al., Case No. CIV-06-556-SPS (OK E.D.) CV-935-L; and *Seminole Nation of Oklahoma v. United States of America*, 06-CV-935-L (CFC).

Blue Tee Matter (meditation involving the former American Zinc plant in Dumas, TX.).

TDY Holdings, LLC and TDY Industries, Inc. v. United States of America, 07-cv-0787-JAH (POR), (S.D. CA.). Deposition and trial testimony were given in this case.

A Rebuttal Report.

A Report on the Ryan Aeronautical Plant in San Diego, California: World War II through the 1950s.

Ute Tribe of Uintah and Ouray Tribes v. United States of America, 06-CV-00866 (CFC).

Raytheon Aircraft Company v. United States of America, 05-CV-2328, (D. KS.). Deposition and trial testimony were given in this case.

A Rebuttal Report on Potential Trichloroethylene Use at the Herington Army Air Field, Herington, Kansas.

Hudson RiverKeeper Fund Inc. v. Atlantic Richfield Co., 94-CV-2741 (WCC) (S.D. NY.). Deposition testimony was given in this case.

A Report on the Anaconda Wire and Cable Plant During World War II at Hastings-on-Hudson, New York.

Tar Creek Superfund Site, Ottawa County, OK, EPA ID OKD980629844.

Ford Motor Company v. United States of America, 04-CV-72018 (E.D. MI.).

Land Grantors in Henderson, Union, & Webster Counties, KY & Their Heirs (Taking Realty), Congressional Reference No. 93-648X (CFC). Trial testimony was given in this case.

A Report on the Government's Acquisition of Land for the Construction of Camp
Breckinridge, Kentucky.

Reynolds Metals Co. and Alcoa Inc. v. United States of America, et al., Civil Action No.
03-1180 (W.D. PA.).

*Confederated Tribes of the Warm Springs Reservation of Oregon v. United States of
America*, Case No. 02-126L (CFC).

United States of America v. Horsehead Industries, Inc., et al., Civil Action No. 3: CV-98-
0654 (M.D. PA.).

United States of America v. Monsanto, Civil Action No. 99-63-DRH (S.D. IL.).

*The Shoshone and Arapahoe Tribes of the Wind River Indian Reservation v. United
States of America*, Dockets 458-79 and 459-79 (CFC).

Alcoa, Inc. v. United States of America, et al., Civil Action No. 96-1098 (W.D. PA.).

Mediation involving Old American Zinc Superfund Site, Fairmont, IL, EPA ID
IL0000034355.

Mediation involving Exxon Mobil, Inc. (Sharon Steel Fairmont Coke Works).

Mediation involving Martin-Dennis (Chemical Land Holding).

Red Lake Band of Chippewa Indians, et al., v. United States of America, No. 189-C
(CFC).

Retained by the law firm of Covington and Burling in the case of *Travelers Indemnity
Company et al., v. Northrop Grumman Corporation*, 1:12-CV-03040 (S.D. NY.).

Retained by the law firm of Gordon, Thomas, Honeywell, Malanca, Peterson & Daheim in
the case of *Skokomish Indian Tribe v. City of Tacoma, et al.*, Civil Action No. C99-5606 FDB
(W.D. WA.).

Tacoma's Public Power System, 1890s-1930s.

SELECT PUBLICATIONS

BOOKS

Empowering the West, Electrical Politics Before FDR (University Press of Kansas,
1998).

This book was nominated for the George P. Marsh Award presented by the American
Society for Environmental History, the Sharlin Memorial Award presented by the Social

Science History Association, and the Best Book Award presented by Westerners International.

CHAPTERS IN BOOKS

“From Water to Power: The Changing Charge of the Bureau of Reclamation,” *Reclamation, Managing Water in the West, The Bureau of Reclamation: History Essays from the Centennial Symposium*, Volume 2 (U.S. Department of the Interior, Bureau of Reclamation, 2008).

“Lighting Las Vegas: Electricity and the City of Glitz” in Mike Davis and Hal Rothman, eds., *The Grid Beneath the Glitter: Tales from the Real Las Vegas* (University of California Press, 2002).

ARTICLES

“Lighting the Reservation: The Impact of the Rural Electrification Administration on Native Lands,” *The Journal of the West* (2001).

“Hydro Power’s Legacy,” *Public Power* 58 (2000). This article was reprinted as “Governing Hydropower: The Story Behind the Law,” *Hydro Review* (2001).

“The Ace: Local Control,” *Public Power* 58 (2000).

“Moving Out and Settling In: Residential Mobility, Homeowning, and the Public Enframing of Citizenship, 1921-1950,” with Ronald Tobey and Charles Wetherell, *American Historical Review* 95 (1990): 1395-1422.

ENCYCLOPEDIA ENTRIES

“Federal Power Act,” Steven L. Danver, ed., *The Encyclopedia of Politics in the American West* (Washington, DC: Mesa Verde Publishing/CQ Press, forthcoming).

“Public Utilities (Federal Policy),” Donald Critchlow and Philip VanderMeer, eds., *Oxford University Encyclopedia of American Political, Policy and Legal History* (New York: Oxford University Press, 2012).

BOOK REVIEWS

Gene A. Budig and Don Walton, *George Norris, Going Home: Reflections of a Progressive Statesman*. (Lincoln and London: University of Nebraska Press, 2013), *Journal of the West*, forthcoming.

Eugene P. Moehring, *Reno, Las Vegas, and The Strip: A Tale of Three Cities*. Wilbur S. Shepperson Series in Nevada History. (Reno: University of Nevada Press, 2014), *Western Historical Quarterly* 46 (Winter) 2015.

Paul W. Hirt, *The Wired Northwest, The History of Electrical Power, 1870s-1970s* (Lawrence: University Press of Kansas, 2012), *Journal of American History*, 2013.

Char Miller, eds. *Cities and Nature in the American West* (Reno and Las Vegas: University of Nevada Press, 2010), *Journal of the West*, 2012.

Zachary A. Smith and John C. Freemuth, eds. *Environmental Politics and Policy in the West*, Revised Edition (Boulder: University Press of Colorado, 2007), *Journal of the West*, 2009.

Gary D. Libecap, *Owens Valley Revisited, A Reassessment of the West's First Great Water Transfer* (Palo Alto: Stanford University Press, 2007), *Journal of the West*, 2008.

John Trombold & Peter Donahue, eds. *Reading Portland: The City in Prose* (Portland: Oregon Historical Society Press; and Seattle University of Washington Press, 2006), *Journal of the West*, 2008.

Renée Corona Kolvet and Victoria Ford, *The Civilian Conservation Corps in Nevada: From Boys to Men* (Reno and Las Vegas: University of Nevada Press, 2006), *Journal of the West*, 2007.

William D. Layman, *River of Memory: The Everlasting Columbia* (Seattle: University of Washington Press; and Vancouver: University of British Columbia Press, 2006), *Journal of the West*, 2007.

Marjorie Weinberg, *The Real Rosebud, The Trump of a Lakota Woman* (Lincoln, NE: University of Nebraska Press, 2004), *Journal of the West*, 2005.

Frank H. Goodyear III, *Red Cloud, Photographs of a Lakota Chief* (Lincoln, NE: University of Nebraska Press, 2003), *Journal of the West*, 2005.

Daniel Tyler, *Silver Fox of the Rockies: Delphus E. Carpenter and Western Water Compacts* (Norman, OK: University of Oklahoma Press, 2003), *Register of the Kentucky Historical Society*, 2003.

Tom H. Hastings, *Ecology of War & Peace: Counting the Cost of Conflict* (Lanham, MD: University Press of America, 2001), *Peace & Change*, 2002.

J. William T. Youngs, *The Fair and The Falls: Spokane's Expo '74 and the Transforming of an American Environment* (Cheney, WA: Eastern Washington University Press, 1996), *Pacific Northwest Quarterly*, 2000.

Char Miller, ed., *American Forests: Nature, Culture, and Politics* (University Press of Kansas, 1997), H-ASEH, H-Net Reviews, 2000. URL: <http://www.h-net.msu.edu/reviews/showrev.cgi?path=10514954955461>.

REPORTS

Public Power and Democracy (American Public Power Association, 2000).

SELECT PRESENTATIONS

“The Changing Political Landscape of Electrical Generation, Transmission, and Distribution in the American West,” panelist, The Electric West: A Roundtable Discussion held at the Western History Association Conference in Denver, CO, October 2009.

“Salmon and Hydropower: The Policy Debates over Hydroelectric Development on the Cowlitz River,” paper delivered at the Western History Association Conference in Fort Worth, TX, October 2003.

“Homer Truett Bone: Hydro and Public Power Crusader,” paper delivered at the American Society of Environmental History Conference, Providence, RI, March 2003.

“From Water to Power: The Changing Charge of the Bureau of Reclamation,” paper delivered at the Bureau of Reclamation’s Centennial Conference, Las Vegas, NV, June 2002.

Panelist, “Public vs. Private: Who Should Own Utilities,” 13th Annual Envisioning California Conference, Center for California Studies at California State University, Sacramento, Sacramento, CA, October 2001.

“Energy Resources and the Development of Modern America,” paper delivered at the Woodrow Wilson National Symposium, “America: Transformation Toward the Modern, 1856-1924,” Staunton, VA, October 2000.

ACADEMIC EXPERIENCE

Courses taught include:

Twentieth Century American History (numerous courses)
American West
Twentieth Century U.S. and American West Undergraduate Writing Seminars
Quantitative Methods and Social Science History
U.S. Survey, 1607-1865 and 1865-Present
Slavery and the Old South
Vietnam War
American Indian Policy

PROFESSIONAL MEMBERSHIPS AND SUBSCRIPTIONS

American Society for Environmental History
Western History Association
Environmental History
Western Historical Quarterly
Montana, The Magazine of Western History
Pacific Historical Review

SELECT PROFESSIONAL ACTIVITY AND SERVICE

Manuscript reviewer for the University of Nebraska Press, 2007.

Guest on “Springboard” technology program, produced by KQED Television, San Francisco, August 2001. Discussed technology and the electrification of rural America.

Guest Lecturer, The George Washington University, Washington, DC 2000, 1997.

BRIGHAM

ATTACHMENT 2



JAY L. BRIGHAM, PH.D., MANAGING PARTNER

Morgan, Angel & Associates, LLC
1601 Connecticut Avenue, NW, Suite 600
Washington, DC 20009
P 202-265-1833, ext. 113 • F 202-265-8022
jay@morganangel.com • www.morganangel.com

EXPERT WITNESS TESTIMONY

Grace Goodeagle v. United States of America, 12-431L (CFC).

Quapaw Tribe of Oklahoma (O-Gah-Pah) v United States of America, 12-592L (CFC).

T.C. Bear v. United States of America, Congressional Reference No. 13-cg-00051X (CFC).

Deposition testimony in the *Goodeagle*, *Quapaw*, and *Bear* cases (July 2016).

PPG Industries, Inc., v. United States of America, 2:12-CV-0352(KM)(MF) (D. of NJ.).
30(b)(6) testimony (June 2016).

Shell Oil Company v. United States of America, 06-141C (CFC). Deposition and trial testimony
(January and February 2016).

An Expert Witness Rebuttal Report Regarding 100-Octane Aviation Gasoline in the
Southern California Refineries Owned by the Shell Oil Company; the Atlantic Richfield
Company; Texaco, Inc.; and Union Oil Company during World War II.

An Expert Witness Report Regarding 100-Octane Aviation Gasoline in the Southern
California Refineries Owned by the Shell Oil Company; the Atlantic Richfield Company;
Texaco, Inc.; and Union Oil Company during World War II.

United States v. Federal Resources Corporation, 2:11-CV-00127-BLW (D. of ID). Deposition
testimony (September 2013).

A Report on the Defense Minerals Exploration Administration Contracts for the
Conjecture Mine and the Minnie Moore Mine.

Exxon Mobil Corporation v. United States of America, 4:11-CV-1914 (D. LA.).

Exxon Mobil Corporation v. United States of America, H:10-2386 (S.D. TX., Houston Division).

Exxon Mobil Corporation, v. United States of America (S.D. Tex. C. A. Nos. H-10-2386 and H-
11-1844) and (Fed. Cl. Nos. 09-165C and 09-0882C).

Deposition testimony in the above three Exxon Mobil cases (February 2013, May 2015).

A Rebuttal and Supplemental Report Regarding the ExxonMobil Facility at Baytown, Texas Formerly Owned by the Humble Oil and Refining Company and the Facility at Baton Rouge, Louisiana Formerly Owned by the Standard Oil Company of Louisiana during World War II.

A Rebuttal Report Regarding the ExxonMobil Facility at Baytown, Texas Formerly Owned by the Humble Oil and Refining Company and the Facility at Baton Rouge, Louisiana Formerly Owned by the Standard Oil of Louisiana, From the World War II Era through the Korean War.

A Report Regarding the ExxonMobil Facility at Baytown, Texas Formerly Owned by the Humble Oil and Refining Company and the Facility at Baton Rouge, Louisiana Formerly Owned by the Standard Oil of Louisiana, From the World War II Era through the Korean War.

United States of America v. Washington State Department of Transportation, 3:08-CV-05722-RJB (W.D. WA.). Deposition and trial testimony (August 2010, April 2011).

A Report on the Army Corps of Engineers and City Waterway, Tacoma Harbor, Washington: 1900-1950.

AVX Corporation v. Horry Land Company, Inc., and United States of America, 4:07-CV-3299-TLW-TER (D. S.C. Florence Division). Deposition and trial testimony (June 2010, March 2011).

A Report on the Myrtle Beach Army Air Field, 1941-1955.

Appleton Papers, Inc. and NCR Corporation v. George Whiting Paper Company, et al., 08-CV-00016-WCG (Consolidated with 08-CV-0895) (E.D. WI.). Deposition testimony (August 2009).

A Report on the Environmental Protection Agency's Recycling Program and the Recycling of Carbonless Paper.

City of Fresno v. United States of America, et al., 1:06-CV-01559-OW-LJO, (E.D. CA.). Deposition testimony (February 2010).

A Report on Hammer Army Air Field, 1940-1948.

American International Specialty Lines Insurance Company v. United States of America, CV06-4686 AHM (RZx), (C.D. CA.). Deposition and trial testimony (January and February 2010).

A Rebuttal Report.

A Report on the Whittaker-Bermite Company.

Litgo New Jersey, Inc., et al. v. Mauriello, et al., 06-2891 (AET) (TB) (D. N.J.). Deposition and trial testimony (September 2009, February 2010).

A Supplemental Report on Columbia Aircraft Products, Incorporated, Somerville, NJ: 1940-1947.

A Report on Columbia Aircraft Products, Incorporated, Somerville, NJ: 1940-1947.

TDY Holdings, LLC and TDY Industries, Inc. v. United States of America, 07-cv-0787-JAH (POR), (S.D. CA.). Deposition and trial testimony (December 2009, May 2012).

A Rebuttal Report.

A Report on the Ryan Aeronautical Plant in San Diego, California: World War II through the 1950s.

Raytheon Aircraft Company v. United States of America, 05-CV-2328, (D. KS.). Deposition and trial testimony (May 2007, April 2008).

A Rebuttal Report on Potential Trichloroethylen Use at the Herington Army Air Field, Herington, Kansas.

Hudson RiverKeeper Fund Inc. v. Atlantic Richfield Co., 94-CV-2741 (WCC) (S.D. N.Y.). Deposition testimony (October 2007).

A Report on the Anaconda Wire and Cable Plant During World War II at Hastings-on-Hudson, New York.

Land Grantors in Henderson, Union, & Webster Counties, KY & Their Heirs (Taking Realty), Congressional Reference No. 93-648X (CFC). Trial testimony (September 2004).

A Report on the Government's Acquisition of Land for the Construction of Camp Breckinridge, Kentucky.

BRIGHAM

ATTACHMENT 3

COMP0000361-68	PPGNPR0014960-75	PPGNPR0027864-91
COMP0000848-73	PPGNPR0014976	PPGNPR0027978-81
COMP0000889-97	PPGNPR0014991-15001	PPGNPR0027982-90
COMP0000898-904	PPGNPR0015011-26	PPGNPR0027991-92
COMP0000905-12	PPGNPR0015038-75	PPGNPR0027995-8020
COMP0000913-18	PPGNPR0015084-96	PPGNPR0028021-47
COMP0000919-26	PPGNPR0015272-90	PPGNPR0028052-56
PPGNPR0000046-55	PPGNPR0015319-31	PPGNPR0028063-70
PPGNPR0000186-97	PPGNPR0015332-37	PPGNPR0028078-86
PPGNPR0000276-77	PPGNPR0015338-51	PPGNPR0028087-98
PPGNPR0000291-306	PPGNPR0015372-84	PPGNPR0028099-106
PPGNPR0000307-25	PPGNPR0015425-49	PPGNPR0028223-46
PPGNPR0000326-29	PPGNPR0015660-66	PPGNPR0028360-62
PPGNPR0000483-91	PPGNPR0015684-85	PPGNPR0028760-73
PPGNPR0000555-60	PPGNPR0015696-98	PPGNPR0029337-50
PPGNPR0003112-38	PPGNPR0015700-01	PPGNPR0029665-92
PPGNPR0003167-70	PPGNPR0015702-03	PPGNPR0029726-43
PPGNPR0003171-74	PPGNPR0015710-35	PPGNPR0029822
PPGNPR0003175-80	PPGNPR0015830-74	PPGNPR0032507
PPGNPR0003181-86	PPGNPR0015875-916	PPGNPR0032613-88
PPGNPR0003227-29	PPGNPR0015998-6032	PPGNPR0036761-62
PPGNPR0003230-32	PPGNPR0016033-35	PPGNPR0038404-27
PPGNPR0003233-35	PPGNPR0016039-68	PPGNPR0038598-621
PPGNPR0003703-15	PPGNPR0016069-91	PPGNPR0058130-294
PPGNPR0004303-08	PPGNPR0026169-226	PPGNPR0058346-564
PPGNPR0004328-30	PPGNPR0026227-43	PPGNPR0058565-709
PPGNPR0008644-47	PPGNPR0026410-566	PPGNPR0058710-924
PPGNPR0008733-36	PPGNPR0026567-778	PPGNPR0058925-9181
PPGNPR0008761-72	PPGNPR0026779-846	PPGNPR0059183-272
PPGNPR0009360-64	PPGNPR0026847-931	PPGNPR0059273
PPGNPR0010907-31	PPGNPR0026932-7063	PPGNPR0059274-635
PPGNPR0010970-1013	PPGNPR0027064-412	PPGNPR0059636
PPGNPR0011842-60	PPGNPR0027413-519	PPGNPR0059637-978
PPGNPR0012470-552	PPGNPR0027742-45	PPGNPR0059979
PPGNPR0013373-82	PPGNPR0027749-51	PPGNPR0059980-81
PPGNPR0013395-416	PPGNPR0027783-89	PPGNPR0059982
PPGNPR0013667-79	PPGNPR0027791-94	PPGNPR0059983-60033
PPGNPR0014125-55	PPGNPR0027795	PPGNPR0060034
PPGNPR0014832-39	PPGNPR0027819	PPGNPR0060035-37
PPGNPR0014952-59	PPGNPR0027820	PPGNPR0060038

PPGNPR0060039-40	PPGNPR0060264	PPGNPR0060341
PPGNPR0060041	PPGNPR0060265	PPGNPR0060342
PPGNPR0060042-98	PPGNPR0060266	PPGNPR0060343
PPGNPR0060099	PPGNPR0060267	PPGNPR0060344-45
PPGNPR0060100-67	PPGNPR0060268-70	PPGNPR0060346
PPGNPR0060168	PPGNPR0060271	PPGNPR0060347
PPGNPR0060169	PPGNPR0060272	PPGNPR0060348
PPGNPR0060170	PPGNPR0060273-78	PPGNPR0060349
PPGNPR0060171-212	PPGNPR0060279	PPGNPR0060350-51
PPGNPR0060213-18	PPGNPR0060280-81	PPGNPR0060352
PPGNPR0060219-23	PPGNPR0060282-84	PPGNPR0060353-54
PPGNPR0060224-25	PPGNPR0060285	PPGNPR0060355-64
PPGNPR0060226	PPGNPR0060286	PPGNPR0060365
PPGNPR0060227	PPGNPR0060287	PPGNPR0060366-68
PPGNPR0060228	PPGNPR0060288-89	PPGNPR0060369
PPGNPR0060229	PPGNPR0060290	PPGNPR0060370-80
PPGNPR0060230	PPGNPR0060291-92	PPGNPR0060381
PPGNPR0060231	PPGNPR0060293	PPGNPR0060382-84
PPGNPR0060232	PPGNPR0060294-97	PPGNPR0060385
PPGNPR0060233-35	PPGNPR0060298-300	PPGNPR0060386
PPGNPR0060236	PPGNPR0060301	PPGNPR0060387
PPGNPR0060237	PPGNPR0060302-05	PPGNPR0060388
PPGNPR0060238	PPGNPR0060306	PPGNPR0060389-96
PPGNPR0060239	PPGNPR0060307	PPGNPR0060397
PPGNPR0060240	PPGNPR0060308-12	PPGNPR0060398-403
PPGNPR0060241	PPGNPR0060313	PPGNPR0060404
PPGNPR0060242	PPGNPR0060314	PPGNPR0060405-06
PPGNPR0060243	PPGNPR0060315-16	PPGNPR0060407
PPGNPR0060244	PPGNPR0060317-18	PPGNPR0060408
PPGNPR0060245	PPGNPR0060319-21	PPGNPR0060409
PPGNPR0060246	PPGNPR0060322	PPGNPR0060410
PPGNPR0060247-53	PPGNPR0060323	PPGNPR0060411-12
PPGNPR0060254	PPGNPR0060324	PPGNPR0060413
PPGNPR0060255	PPGNPR0060325	PPGNPR0060414-16
PPGNPR0060256	PPGNPR0060326	PPGNPR0060417
PPGNPR0060257	PPGNPR0060327-31	PPGNPR0060418-20
PPGNPR0060258	PPGNPR00603306	PPGNPR0060421-22
PPGNPR0060259	PPGNPR0060332-33	PPGNPR0060423
PPGNPR0060260-61	PPGNPR0060334	PPGNPR0060424-25
PPGNPR0060262	PPGNPR0060335-39	PPGNPR0060426
PPGNPR0060263	PPGNPR0060340	PPGNPR0060427

PPGNPR0060428	PPGNPR0060967	PPGNPR0062761
PPGNPR0060429	PPGNPR0060968	PPGNPR0062762
PPGNPR0060430-32	PPGNPR0060969	PPGNPR0062763
PPGNPR0060433-36	PPGNPR0060970-1039	PPGNPR0062764
PPGNPR0060437	PPGNPR0061040	PPGNPR0062765
PPGNPR0060438	PPGNPR0061041-47	PPGNPR0062766
PPGNPR0060439-40	PPGNPR0061048	PPGNPR0062767
PPGNPR0060441	PPGNPR0061049-63	PPGNPR0062768
PPGNPR0060442-44	PPGNPR0061064	PPGNPR0062769
PPGNPR0060445	PPGNPR0061065-66	PPGNPR0062770
PPGNPR0060446	PPGNPR0061067	PPGNPR0062771-72
PPGNPR0060447	PPGNPR0061068	PPGNPR0062773
PPGNPR0060448-49	PPGNPR0061069	PPGNPR0062774-75
PPGNPR0060450	PPGNPR0061070	PPGNPR0062776
PPGNPR0060451-62	PPGNPR0061071	PPGNPR0062777-83
PPGNPR0060463	PPGNPR0061072	PPGNPR0063576-658
PPGNPR0060464-65	PPGNPR0061073-77	PPGNPR0063781-4002
PPGNPR0060466	PPGNPR0061078	PPGNPR0064023-37
PPGNPR0060467-70	PPGNPR0061079	PPGNPR0064038-39
PPGNPR0060471	PPGNPR0061080-259	PPGNPR0064040-188
PPGNPR0060472	PPGNPR0061260-339	PPGNPR0064189-95
PPGNPR0060473	PPGNPR0061354-381	PPGNPR0064196-207
PPGNPR0060474	PPGNPR0061703-896	PPGNPR0064208-09
PPGNPR0060475	PPGNPR0062382-409	PPGNPR0064210-69
PPGNPR0060476	PPGNPR0062607-739	PPGNPR0064277
PPGNPR0060477	PPGNPR0062740	PPGNPR0064278-347
PPGNPR0060478	PPGNPR0062741	PPGNPR0064348-54
PPGNPR0060479	PPGNPR0062742	PPGNPR0064355-66
PPGNPR0060480	PPGNPR0062743	PPGNPR0064367-88
PPGNPR0060481-546	PPGNPR0062744	PPGNPR0064389-98
PPGNPR0060548-785	PPGNPR0062745	PPGNPR0064399-414
PPGNPR0060786-87	PPGNPR0062746	PPGNPR0064415
PPGNPR0060788	PPGNPR0062747	PPGNPR0064416
PPGNPR0060789-91	PPGNPR0062748	PPGNPR0064417-18
PPGNPR0060792-800	PPGNPR0062749	PPGNPR0064419
PPGNPR0060801-11	PPGNPR0062750-57	PPGNPR0064420
PPGNPR0060812-13	PPGNPR0062758	PPGNPR0064421
PPGNPR0060814-25	PPGNPR0062759	PPGNPR0064422
PPGNPR0060826-966	PPGNPR0062760	PPGNPR0064423

PPGNPR0064424	PPGNPR0065564	PPGNPR0065663
PPGNPR0064425	PPGNPR0065565-66	PPGNPR0065664
PPGNPR0064427-29	PPGNPR0065567	PPGNPR0065665-71
PPGNPR0064430-32	PPGNPR0065568	PPGNPR0065672
PPGNPR0064433-36	PPGNPR0065569	PPGNPR0065673
PPGNPR0064437-44	PPGNPR0065570	PPGNPR0065674
PPGNPR0064445	PPGNPR0065571-629	PPGNPR0065675
PPGNPR0064446-51	PPGNPR0065630	PPGNPR0065676-82
PPGNPR0064452	PPGNPR0065631	PPGNPR0065683
PPGNPR0064453	PPGNPR0065632	PPGNPR0065684-95
PPGNPR0064454-58	PPGNPR0065633	PPGNPR0065696
PPGNPR0064459-60	PPGNPR0065634	PPGNPR0065697-705
PPGNPR0064463-66	PPGNPR0065635	PPGNPR0065706
PPGNPR0064467-73	PPGNPR0065636	PPGNPR0065707-21
PPGNPR0064474-77	PPGNPR0065637	PPGNPR0065722
PPGNPR0064478-79	PPGNPR0065638	PPGNPR0065723
PPGNPR0064480-82	PPGNPR0065639	PPGNPR0065724
PPGNPR0064483-86	PPGNPR0065640	PPGNPR0065725-49
PPGNPR0064487-88	PPGNPR0065641	PPGNPR0065750-74
PPGNPR0064489	PPGNPR0065642	PPGNPR0065775
PPGNPR0064490	PPGNPR0065643	PPGNPR0065776-86
PPGNPR0064491	PPGNPR0065644	PPGNPR0065787-811
PPGNPR0064492-591	PPGNPR0065645	PPGNPR0065812-36
PPGNPR0064592	PPGNPR0065646	PPGNPR0065837
PPGNPR0064593	PPGNPR0065647	PPGNPR0065838
PPGNPR0064594-95	PPGNPR0065648	PPGNPR0065839-59
PPGNPR0064596-97	PPGNPR0065649	PPGNPR0065860
PPGNPR0064598-608	PPGNPR0065650	PPGNPR0065861-65
PPGNPR0064609-10	PPGNPR0065651	PPGNPR0065866
PPGNPR0064611-14	PPGNPR0065652	PPGNPR0065867
PPGNPR0064615-17	PPGNPR0065653	PPGNPR0065868-72
PPGNPR0064618	PPGNPR0065654	PPGNPR0065873
PPGNPR0064619	PPGNPR0065655	PPGNPR0065874
PPGNPR0064620-21	PPGNPR0065656	PPGNPR0065875-79
PPGNPR0064622	PPGNPR0065657	PPGNPR0065884
PPGNPR0064623	PPGNPR0065658	PPGNPR0065885-87
PPGNPR0064624-28	PPGNPR0065659	PPGNPR0065888
PPGNPR0064629-30	PPGNPR0065660	PPGNPR0065889-90
PPGNPR0064631-35	PPGNPR0065661	PPGNPR0065891-94
PPGNPR0065271-451	PPGNPR0065662	PPGNPR0065895

PPGNPR0065896	PPGNPR0067999-8000	PPGNPR0068419
PPGNPR0065897	PPGNPR0068001-02	PPGNPR0068420
PPGNPR0065898	PPGNPR0068003-04	PPGNPR0068421
PPGNPR0065899	PPGNPR0068005-19	PPGNPR0068422
PPGNPR0065900	PPGNPR0068020-168	PPGNPR0068423
PPGNPR0065901	PPGNPR0068169-75	PPGNPR0068424
PPGNPR0065902	PPGNPR0068176-77	PPGNPR0068425
PPGNPR0065903	PPGNPR0068178-79	PPGNPR0068426
PPGNPR0065904	PPGNPR0068180	PPGNPR0068503-42
PPGNPR0065905	PPGNPR0068181-92	PPGNPR0068543
PPGNPR0065906	PPGNPR0068193-94	PPGNPR0068753-858
PPGNPR0065907	PPGNPR0068195-254	PPGNPR0068859
PPGNPR0065908	PPGNPR0068256	PPGNPR0068860
PPGNPR0065909	PPGNPR0068272	PPGNPR0068861
PPGNPR0065910	PPGNPR0068273-78	PPGNPR0068862-63
PPGNPR0065911	PPGNPR0068279-85	PPGNPR0068864
PPGNPR0065912	PPGNPR0068286-95	PPGNPR0068865-70
PPGNPR0065913	PPGNPR0068296-97	PPGNPR0068871-9000
PPGNPR0065914	PPGNPR0068298	PPGNPR0069001
PPGNPR0065915	PPGNPR0068299	PPGNPR0069002
PPGNPR0065916	PPGNPR0068300	PPGNPR0069003
PPGNPR0065917	PPGNPR0068301	PPGNPR0069004
PPGNPR0065918	PPGNPR0068302-13	PPGNPR0069005
PPGNPR0065919	PPGNPR0068314-35	PPGNPR0069006
PPGNPR0065920	PPGNPR0068336-41	PPGNPR0069007
PPGNPR0065921	PPGNPR0068342-85	PPGNPR0069008
PPGNPR0065922	PPGNPR0068386-90	PPGNPR0069009
PPGNPR0065923	PPGNPR0068391	PPGNPR0069011-168
PPGNPR0067096-189	PPGNPR0068392-98	PPGNPR0069169
PPGNPR0067190-261	PPGNPR0068399	PPGNPR0069170-279
PPGNPR0067262-531	PPGNPR0068400-07	PPGNPR0069280-413
PPGNPR0067684	PPGNPR0068408-09	PPGNPR0069414
PPGNPR0067906	PPGNPR0068410-11	PPGNPR0069415
PPGNPR0067907	PPGNPR0068412	PPGNPR0069416
PPGNPR0067908	PPGNPR0068413	PPGNPR0069417
PPGNPR0067993	PPGNPR0068414	PPGNPR0069418-72
PPGNPR0067994	PPGNPR0068415	PPGNPR0070480-538
PPGNPR0067995	PPGNPR0068416	PPGNPR0070539
PPGNPR0067996	PPGNPR0068417	PPGNPR0070540-41
PPGNPR0067997-98	PPGNPR0068418	PPGNPR0070542

PPGNPR0070543-44	PPGNPR0070825	PPGNPR0071026
PPGNPR0070545	PPGNPR0070826-37	PPGNPR0071027-35
PPGNPR0070546-47	PPGNPR0070838	PPGNPR0071036-42
PPGNPR0070548	PPGNPR0070839-64	PPGNPR0071043
PPGNPR0070549-50	PPGNPR0070865-89	PPGNPR0071044-47
PPGNPR0070551	PPGNPR0070890	PPGNPR0071048
PPGNPR0070552-53	PPGNPR0070891-959	PPGNPR0071049-52
PPGNPR0070554	PPGNPR0070960	PPGNPR0071053
PPGNPR0070555-56	PPGNPR0070961-63	PPGNPR0071054
PPGNPR0070557	PPGNPR0070964	PPGNPR0071055
PPGNPR0070558-59	PPGNPR0070965-71	PPGNPR0071056
PPGNPR0070560	PPGNPR0070972	PPGNPR0071057-59
PPGNPR0070561	PPGNPR0070973	PPGNPR0071060
PPGNPR0070562-68	PPGNPR0070974-79	PPGNPR0071061
PPGNPR0070569-71	PPGNPR0070980-82	PPGNPR0071062
PPGNPR0070572	PPGNPR0070983-88	PPGNPR0071063
PPGNPR0070573	PPGNPR0070989	PPGNPR0071064
PPGNPR0070574-80	PPGNPR0070990	PPGNPR0071065
PPGNPR0070581	PPGNPR0070991-92	PPGNPR0071066
PPGNPR0070582-88	PPGNPR0070993	PPGNPR0071067
PPGNPR0070589	PPGNPR0070994-95	PPGNPR0071068
PPGNPR0070590-604	PPGNPR0070996	PPGNPR0071069
PPGNPR0070605	PPGNPR0070997-98	PPGNPR0071070
PPGNPR0070633	PPGNPR0070999	PPGNPR0071071
PPGNPR0070634	PPGNPR0071000-01	PPGNPR0071072
PPGNPR0070635	PPGNPR0071002	PPGNPR0071073-74
PPGNPR0070636-781	PPGNPR0071003-04	PPGNPR0071075
PPGNPR0070782	PPGNPR0071005	PPGNPR0071076
PPGNPR0070784	PPGNPR0071010	PPGNPR0071077
PPGNPR0070785-90	PPGNPR0071011-12	PPGNPR0071078
PPGNPR0070791-92	PPGNPR0071013	PPGNPR0071079
PPGNPR0070793-98	PPGNPR0071014	PPGNPR0071080-81
PPGNPR0070799	PPGNPR0071015	PPGNPR0071082
PPGNPR0070800-01	PPGNPR0071016	PPGNPR0071083-84
PPGNPR0070802	PPGNPR0071017-19	PPGNPR0071085
PPGNPR0070803-05	PPGNPR0071020	PPGNPR0071086-87
PPGNPR0070806-09	PPGNPR0071021	PPGNPR0071088
PPGNPR0070810-17	PPGNPR0071022	PPGNPR0071089
PPGNPR0070818	PPGNPR0071023-24	PPGNPR0071090
PPGNPR0070819-24	PPGNPR0071025	PPGNPR0071091

PPGNPR0071092	PPGNPR0071140	PPGNPR0071184
PPGNPR0071093-94	PPGNPR0071141	PPGNPR0071185
PPGNPR0071095	PPGNPR0071142	PPGNPR0071186
PPGNPR0071096	PPGNPR0071143	PPGNPR0071187
PPGNPR0071097	PPGNPR0071144	PPGNPR0071188
PPGNPR0071098-99	PPGNPR0071145-46	PPGNPR0071189
PPGNPR0071100	PPGNPR0071147	PPGNPR0071190
PPGNPR0071101-02	PPGNPR0071148	PPGNPR0071191
PPGNPR0071103	PPGNPR0071149	PPGNPR0071192
PPGNPR0071104	PPGNPR0071150	PPGNPR0071193-96
PPGNPR0071105	PPGNPR0071151	PPGNPR0071197
PPGNPR0071106	PPGNPR0071152	PPGNPR0071198
PPGNPR0071107	PPGNPR0071153	PPGNPR0071199
PPGNPR0071108-09	PPGNPR0071154	PPGNPR0071200
PPGNPR0071110	PPGNPR0071155	PPGNPR0071201-02
PPGNPR0071111-13	PPGNPR0071156	PPGNPR0071203-397
PPGNPR0071114	PPGNPR0071157	PPGNPR0071398-485
PPGNPR0071115	PPGNPR0071158	PPGNPR0071486-594
PPGNPR0071116	PPGNPR0071159	PPGNPR0071595-825
PPGNPR0071117	PPGNPR0071160	PPGNPR0071826
PPGNPR0071118	PPGNPR0071161	PPGNPR0071827
PPGNPR0071119	PPGNPR0071162-63	PPGNPR0071828
PPGNPR0071120	PPGNPR0071164	PPGNPR0071829
PPGNPR0071121	PPGNPR0071165	PPGNPR0071831
PPGNPR0071122	PPGNPR0071166	PPGNPR0071832
PPGNPR0071123	PPGNPR0071167	PPGNPR0071835
PPGNPR0071124	PPGNPR0071168	PPGNPR0071836
PPGNPR0071125-26	PPGNPR0071169	PPGNPR0071837
PPGNPR0071127	PPGNPR0071170	PPGNPR0071842
PPGNPR0071128	PPGNPR0071171	PPGNPR0071843
PPGNPR0071129	PPGNPR0071172	PPGNPR0071851
PPGNPR0071130	PPGNPR0071173	PPGNPR0071852
PPGNPR0071131	PPGNPR0071174	PPGNPR0071854
PPGNPR0071132-33	PPGNPR0071175	PPGNPR0071873
PPGNPR0071134	PPGNPR0071176	PPGNPR0071874
PPGNPR0071135	PPGNPR0071177-79	PPGNPR0071939
PPGNPR0071136	PPGNPR0071180	PPGNPR0071940
PPGNPR0071137	PPGNPR0071181	PPGNPR0071942
PPGNPR0071138	PPGNPR0071182	PPGNPR0071993
PPGNPR0071139	PPGNPR0071183	PPGNPR0071994

PPGNPR0072001	PPGNPR0073236	PPGNPR0073726
PPGNPR0072002	PPGNPR0073237	PPGNPR0073752
PPGNPR0072003	PPGNPR0073239	PPGNPR0073753
PPGNPR0072004	PPGNPR0073240	PPGNPR0073754
PPGNPR0072005	PPGNPR0073241	PPGNPR0073755
PPGNPR0072347	PPGNPR0073242	PPGNPR0073756
PPGNPR0072348	PPGNPR0073243	PPGNPR0073757
PPGNPR0072349	PPGNPR0073244	PPGNPR0073759
PPGNPR0072350	PPGNPR0073295	PPGNPR0073835
PPGNPR0072351	PPGNPR0073338	PPGNPR0073836
PPGNPR0072769	PPGNPR0073339	PPGNPR0073840
PPGNPR0072770	PPGNPR0073340	PPGNPR0073848
PPGNPR0072933	PPGNPR0073341	PPGNPR0073850
PPGNPR0072934	PPGNPR0073342	PPGNPR0073851
PPGNPR0072935	PPGNPR0073343	PPGNPR0074033
PPGNPR0072936	PPGNPR0073344	PPGNPR0074210
PPGNPR0072947	PPGNPR0073345	PPGNPR0074211
PPGNPR0072948	PPGNPR0073346	PPGNPR0074212
PPGNPR0072984	PPGNPR0073347	PPGNPR0074213
PPGNPR0073157	PPGNPR0073350	PPGNPR0074214
PPGNPR0073158	PPGNPR0073351	PPGNPR0074215
PPGNPR0073159	PPGNPR0073352	PPGNPR0074218
PPGNPR0073160	PPGNPR0073353	PPGNPR0074219
PPGNPR0073161	PPGNPR0073354	PPGNPR0074220
PPGNPR0073163	PPGNPR0073355	PPGNPR0074228
PPGNPR0073164	PPGNPR0073356	PPGNPR0074540
PPGNPR0073165	PPGNPR0073357	PPGNPR0074541
PPGNPR0073166	PPGNPR0073358	PPGNPR0074542
PPGNPR0073167	PPGNPR0073359	PPGNPR0074543
PPGNPR0073168	PPGNPR0073550	PPGNPR0074545
PPGNPR0073170	PPGNPR0073551	PPGNPR0074546
PPGNPR0073171	PPGNPR0073552	PPGNPR0074547
PPGNPR0073174	PPGNPR0073553	PPGNPR0074548
PPGNPR0073175	PPGNPR0073554	PPGNPR0074549
PPGNPR0073176	PPGNPR0073555	PPGNPR0074550
PPGNPR0073177	PPGNPR0073667	PPGNPR0074553
PPGNPR0073229	PPGNPR0073668	PPGNPR0074554
PPGNPR0073230	PPGNPR0073678	PPGNPR0074555
PPGNPR0073232	PPGNPR0073720	PPGNPR0074556
PPGNPR0073233	PPGNPR0073725	PPGNPR0074559

PPGNPR0074560	PPGNPR0074641	PPGNPR0075587-92
PPGNPR0074562	PPGNPR0074642	PPGNPR0075593-94
PPGNPR0074563	PPGNPR0074643	PPGNPR0075595-600
PPGNPR0074564	PPGNPR0074657	PPGNPR0075603
PPGNPR0074565	PPGNPR0074658	PPGNPR0075604-05
PPGNPR0074566	PPGNPR0074659	PPGNPR0075606
PPGNPR0074569	PPGNPR0074661	PPGNPR0075607
PPGNPR0074571	PPGNPR0074662	PPGNPR0075608-19
PPGNPR0074572	PPGNPR0074663	PPGNPR0075620-70
PPGNPR0074573	PPGNPR0074664	PPGNPR0075671
PPGNPR0074574	PPGNPR0074665	PPGNPR0075672
PPGNPR0074577	PPGNPR0074666	PPGNPR0075673
PPGNPR0074579	PPGNPR0074667	PPGNPR0075674
PPGNPR0074581	PPGNPR0074668	PPGNPR0075675-76
PPGNPR0074582	PPGNPR0074669	PPGNPR0075677-92
PPGNPR0074583	PPGNPR0074670	PPGNPR0075693-95
PPGNPR0074584	PPGNPR0074673	PPGNPR0075696-98
PPGNPR0074586	PPGNPR0074675	PPGNPR0075699
PPGNPR0074590	PPGNPR0074677	PPGNPR0075700-08
PPGNPR0074594	PPGNPR0074679	PPGNPR0075709
PPGNPR0074595	PPGNPR0074680	PPGNPR0075710
PPGNPR0074596	PPGNPR0074681	PPGNPR0075711
PPGNPR0074597	PPGNPR0074684	PPGNPR0075712
PPGNPR0074598	PPGNPR0074685	PPGNPR0075713
PPGNPR0074599	PPGNPR0074691	PPGNPR0075714
PPGNPR0074600	PPGNPR0074692	PPGNPR0075715
PPGNPR0074612	PPGNPR0074693	PPGNPR0075716
PPGNPR0074615	PPGNPR0074694	PPGNPR0075717
PPGNPR0074616	PPGNPR0074703	PPGNPR0075718
PPGNPR0074617	PPGNPR0074707	PPGNPR0075719-20
PPGNPR0074618	PPGNPR0074711	PPGNPR0075721-22
PPGNPR0074619	PPGNPR0074712	PPGNPR0075723-24
PPGNPR0074620	PPGNPR0074713	PPGNPR0075725
PPGNPR0074626	PPGNPR0074714	PPGNPR0075726
PPGNPR0074631	PPGNPR0074715	PPGNPR0075727-36
PPGNPR0074632	PPGNPR0074716	PPGNPR0075737
PPGNPR0074633	PPGNPR0074717	PPGNPR0075738-44
PPGNPR0074635	PPGNPR0074852-908	PPGNPR0075745-49
PPGNPR0074637	PPGNPR0075037-43	PPGNPR0075750-57
PPGNPR0074638	PPGNPR0075050	PPGNPR0075758-67

PPGNPR0075768	PPGNPR0076760-61	PPGNPR0076879-80
PPGNPR0075769-886	PPGNPR0076762-63	PPGNPR0076881
PPGNPR0075887-976	PPGNPR0076766	PPGNPR0076882-83
PPGNPR0075980	PPGNPR0076767	PPGNPR0076884-85
PPGNPR0075981	PPGNPR0076768-70	PPGNPR0076886-87
PPGNPR0075982	PPGNPR0076771-72	PPGNPR0076888
PPGNPR0075983	PPGNPR0076773-74	PPGNPR0076891-92
PPGNPR0075984	PPGNPR0076775-76	PPGNPR0076893-94
PPGNPR0075985	PPGNPR0076778-79	PPGNPR0076895
PPGNPR0075986	PPGNPR0076781-82	PPGNPR0076896-97
PPGNPR0075987	PPGNPR0076784-85	PPGNPR0076898
PPGNPR0075988	PPGNPR0076788	PPGNPR0076899-900
PPGNPR0075989	PPGNPR0076789-805	PPGNPR0076901-02
PPGNPR0075990	PPGNPR0076806-08	PPGNPR0076905-06
PPGNPR0075991	PPGNPR0076809	PPGNPR0076907
PPGNPR0075992	PPGNPR0076810	PPGNPR0076910-11
PPGNPR0075993	PPGNPR0076811-12	PPGNPR0076918-19
PPGNPR0075994	PPGNPR0076813-14	PPGNPR0076920
PPGNPR0075995	PPGNPR0076815-16	PPGNPR0076921-22
PPGNPR0075996	PPGNPR0076817-18	PPGNPR0076924
PPGNPR0075997	PPGNPR0076821-22	PPGNPR0076925
PPGNPR0075998	PPGNPR0076823-24	PPGNPR0076926
PPGNPR0075999	PPGNPR0076825-26	PPGNPR0076928
PPGNPR0076000	PPGNPR0076827-28	PPGNPR0076929
PPGNPR0076001	PPGNPR0076829-30	PPGNPR0076930-31
PPGNPR0076002	PPGNPR0076832-33	PPGNPR0076933
PPGNPR0076003	PPGNPR0076836-37	PPGNPR0076934-35
PPGNPR0076004	PPGNPR0076839-40	PPGNPR0076937-38
PPGNPR0076441-740	PPGNPR0076842-43	PPGNPR0076939
PPGNPR0076742	PPGNPR0076844-45	PPGNPR0076940-41
PPGNPR0076743	PPGNPR0076847-48	PPGNPR0076942-43
PPGNPR0076744	PPGNPR0076851-52	PPGNPR0076945-46
PPGNPR0076745	PPGNPR0076854-55	PPGNPR0076948-49
PPGNPR0076746	PPGNPR0076857-58	PPGNPR0076951-52
PPGNPR0076747-48	PPGNPR0076860-61	PPGNPR0076953
PPGNPR0076749-50	PPGNPR0076863-64	PPGNPR0076954-55
PPGNPR0076751-52	PPGNPR0076868-69	PPGNPR0076959
PPGNPR0076753-54	PPGNPR0076873-74	PPGNPR0076960-61
PPGNPR0076756-57	PPGNPR0076875-76	PPGNPR0076964-65
PPGNPR0076759	PPGNPR0076877-78	PPGNPR0076969-70

PPGNPR0076973-74	PPGNPR0077045	PPGNPR0077128-29
PPGNPR0076975	PPGNPR0077046	PPGNPR0077133-34
PPGNPR0076976-77	PPGNPR0077047-48	PPGNPR0077135
PPGNPR0076979-80	PPGNPR0077050-51	PPGNPR0077138
PPGNPR0076981	PPGNPR0077053	PPGNPR0077139
PPGNPR0076982-83	PPGNPR0077054-55	PPGNPR0077140
PPGNPR0076984	PPGNPR0077058-59	PPGNPR0077141
PPGNPR0076985-86	PPGNPR0077065	PPGNPR0077142
PPGNPR0076987	PPGNPR0077066	PPGNPR0077145
PPGNPR0076988-89	PPGNPR0077067-68	PPGNPR0077146
PPGNPR0076990-91	PPGNPR0077070-71	PPGNPR0077147
PPGNPR0076992	PPGNPR0077072	PPGNPR0077148
PPGNPR0076993-94	PPGNPR0077073-74	PPGNPR0077149
PPGNPR0076995	PPGNPR0077075-76	PPGNPR0077156
PPGNPR0076996	PPGNPR0077077	PPGNPR0077157
PPGNPR0076997	PPGNPR0077078	PPGNPR0077158
PPGNPR0076998-99	PPGNPR0077079-80	PPGNPR0077159-60
PPGNPR0077000	PPGNPR0077081-82	PPGNPR0077161-62
PPGNPR0077001-02	PPGNPR0077084	PPGNPR0077163
PPGNPR0077003	PPGNPR0077085-86	PPGNPR0077164
PPGNPR0077004-05	PPGNPR0077087-88	PPGNPR0077166
PPGNPR0077006-07	PPGNPR0077089-90	PPGNPR0077167
PPGNPR0077008-09	PPGNPR0077091-92	PPGNPR0077168
PPGNPR0077011-12	PPGNPR0077093-94	PPGNPR0077170-73
PPGNPR0077014-15	PPGNPR0077096	PPGNPR0077174-75
PPGNPR0077016	PPGNPR0077097-98	PPGNPR0077176-78
PPGNPR0077017-18	PPGNPR0077101-02	PPGNPR0077179-80
PPGNPR0077019	PPGNPR0077103-04	PPGNPR0077181-82
PPGNPR0077020-21	PPGNPR0077106-07	PPGNPR0077185
PPGNPR0077027-28	PPGNPR0077109-10	PPGNPR0077186-87
PPGNPR0077029-30	PPGNPR0077112-13	PPGNPR0077188-89
PPGNPR0077031-32	PPGNPR0077114-15	PPGNPR0077190
PPGNPR0077033-34	PPGNPR0077117-18	PPGNPR0077191-92
PPGNPR0077035-36	PPGNPR0077119	PPGNPR0077193
PPGNPR0077037	PPGNPR0077120	PPGNPR0077194
PPGNPR0077039	PPGNPR0077121	PPGNPR0077195
PPGNPR0077040	PPGNPR0077122	PPGNPR0077196
PPGNPR0077041	PPGNPR0077123-24	PPGNPR0077197
PPGNPR0077042	PPGNPR0077125	PPGNPR0077198
PPGNPR0077044	PPGNPR0077126-27	PPGNPR0077199

PPGNPR0077200-01	PPGNPR0077493-606	PPGNPR0079825
PPGNPR0077202-03	PPGNPR0077607-83	PPGNPR0079826-993
PPGNPR0077204-05	PPGNPR0077684	PPGNPR0079994
PPGNPR0077206-07	PPGNPR0077686	PPGNPR0079995
PPGNPR0077208-09	PPGNPR0077688	PPGNPR0079996
PPGNPR0077210-11	PPGNPR0077865	PPGNPR0079997-80001
PPGNPR0077212	PPGNPR0077980	PPGNPR0080002
PPGNPR0077213-14	PPGNPR0077981	PPGNPR0080003
PPGNPR0077215-16	PPGNPR0077982	PPGNPR0080004
PPGNPR0077217-20	PPGNPR0078170	PPGNPR0080005-13
PPGNPR0077221	PPGNPR0078344	PPGNPR0080014
PPGNPR0077222	PPGNPR0078345	PPGNPR0080015-32
PPGNPR0077223	PPGNPR0078346	PPGNPR0080033
PPGNPR0077224	PPGNPR0078347	PPGNPR0080034
PPGNPR0077225-26	PPGNPR0078348	PPGNPR0080035
PPGNPR0077227-28	PPGNPR0078544	PPGNPR0080036
PPGNPR0077229	PPGNPR0078545	PPGNPR0080037
PPGNPR0077230-35	PPGNPR0078717	PPGNPR0080038
PPGNPR0077236-44	PPGNPR0078718	PPGNPR0080039
PPGNPR0077245	PPGNPR0078720	PPGNPR0080040
PPGNPR0077246-63	PPGNPR0078721	PPGNPR0080041
PPGNPR0077264-83	PPGNPR0078722	PPGNPR0080042
PPGNPR0077308	PPGNPR0078723	PPGNPR0080043
PPGNPR0077309	PPGNPR0078919	PPGNPR0080044-51
PPGNPR0077310	PPGNPR0078920	PPGNPR0080052
PPGNPR0077311-12	PPGNPR0078921	PPGNPR0080053
PPGNPR0077313	PPGNPR0079107	PPGNPR0080054
PPGNPR0077314-15	PPGNPR0079108-308	PPGNPR0080055
PPGNPR0077316-17	PPGNPR0079309-15	PPGNPR0080056
PPGNPR0077318	PPGNPR0079316-18	PPGNPR0080057
PPGNPR0077319-20	PPGNPR0079319-20	PPGNPR0080058
PPGNPR0077321-32	PPGNPR0079321-513	PPGNPR0080059
PPGNPR0077333-39	PPGNPR0079514	PPGNPR0080060
PPGNPR0077340-51	PPGNPR0079515-98	PPGNPR0080061
PPGNPR0077352-53	PPGNPR0079599-700	PPGNPR0080062
PPGNPR0077354-413	PPGNPR0079701-804	PPGNPR0080063
PPGNPR0077414-83	PPGNPR0079805	PPGNPR0080064
PPGNPR0077484-90	PPGNPR0079806	PPGNPR0080221-26
PPGNPR0077491	PPGNPR0079807-16	PPGNPR0080227-28
PPGNPR0077492	PPGNPR0079817-24	PPGNPR0080231

PPGNPR0080296	PPGNPR0082073	PPGNPR0082141
PPGNPR0080584	PPGNPR0082074-75	PPGNPR0082142
PPGNPR0080649	PPGNPR0082076	PPGNPR0082143
PPGNPR0080650	PPGNPR0082077	PPGNPR0082144
PPGNPR0080651	PPGNPR0082078	PPGNPR0082145
PPGNPR0080652	PPGNPR0082079	PPGNPR0082146
PPGNPR0080939	PPGNPR0082080	PPGNPR0082147-98
PPGNPR0081072-77	PPGNPR0082081	PPGNPR0082199-436
PPGNPR0081078-140	PPGNPR0082082-83	PPGNPR0082437-93
PPGNPR0081141	PPGNPR0082084-87	PPGNPR0082494
PPGNPR0081142	PPGNPR0082088-91	PPGNPR0082495
PPGNPR0081332	PPGNPR0082092	PPGNPR0082496
PPGNPR0081539	PPGNPR0082093	PPGNPR0082497
PPGNPR0081752	PPGNPR0082094-107	PPGNPR0082498
PPGNPR0081842-45	PPGNPR0082108	PPGNPR0082499
PPGNPR0081846	PPGNPR0082109	PPGNPR0082500
PPGNPR0081847	PPGNPR0082110	PPGNPR0082501
PPGNPR0081848	PPGNPR0082111-12	PPGNPR0082502
PPGNPR0081849-50	PPGNPR0082113	PPGNPR0082503
PPGNPR0081851	PPGNPR0082114	PPGNPR0082504
PPGNPR0081852	PPGNPR0082115	PPGNPR0082505-16
PPGNPR0081853	PPGNPR0082116	PPGNPR0082517
PPGNPR0081854-55	PPGNPR0082117	PPGNPR0082518-19
PPGNPR0081856	PPGNPR0082118	PPGNPR0082520-79
PPGNPR0081857-58	PPGNPR0082119	PPGNPR0082580
PPGNPR0081859-61	PPGNPR0082121	PPGNPR0082581
PPGNPR0081862-2057	PPGNPR0082123	PPGNPR0082582-87
PPGNPR0082058	PPGNPR0082124	PPGNPR0082588-90
PPGNPR0082059	PPGNPR0082125	PPGNPR0082591-96
PPGNPR0082060	PPGNPR0082126	PPGNPR0082597
PPGNPR0082061	PPGNPR0082127-28	PPGNPR0082598
PPGNPR0082062-64	PPGNPR0082129	PPGNPR0082599-602
PPGNPR0082065	PPGNPR0082130	PPGNPR0082603
PPGNPR0082066	PPGNPR0082131-32	PPGNPR0082604-06
PPGNPR0082067	PPGNPR0082133-34	PPGNPR0082607
PPGNPR0082068	PPGNPR0082135	PPGNPR0082608-17
PPGNPR0082069	PPGNPR0082136	PPGNPR0082618
PPGNPR0082070	PPGNPR0082137-38	PPGNPR0082619-24
PPGNPR0082071	PPGNPR0082139	PPGNPR0082625-27
PPGNPR0082072	PPGNPR0082140	PPGNPR0082628-33

PPGNPR0082634-36	PPGNPR0084335	PPGNPR0100692
PPGNPR0082637	PPGNPR0084336-37	PPGNPR0100704
PPGNPR0082638	PPGNPR0084338-42	PPGNPR0100722
PPGNPR0082639	PPGNPR0084343	PPGNPR0100743
PPGNPR0082640-44	PPGNPR0084344	PPGNPR0100776
PPGNPR0082645	PPGNPR0084345	PPGNPR0100894
PPGNPR0082646-47	PPGNPR0084347	PPGNPR0100914
PPGNPR0082648	PPGNPR0084348-49	PPGNPR0100930
PPGNPR0082649-50	PPGNPR0084350-52	PPGNPR0100958
PPGNPR0082651	PPGNPR0084353	PPGNPR0102032
PPGNPR0082654	PPGNPR0084354	PPGNPR0111069
PPGNPR0082655-56	PPGNPR0084355	PPGNPR0111110
PPGNPR0082657	PPGNPR0084356	PPGNPR0111228
PPGNPR0082661	PPGNPR0084357-61	PPGNPR0112371-426
PPGNPR0082662	PPGNPR0084362	PPGNPR0112427-525
PPGNPR0082664-68	PPGNPR0084363	PPGNPR0113647
PPGNPR0082669	PPGNPR0084364	PPGNPR0118386
PPGNPR0082671	PPGNPR0084365	PPGNPR0118431
PPGNPR0082672	PPGNPR0084366	PPGNPR0118612
PPGNPR0082673	PPGNPR0084367	PPGNPR0118692
PPGNPR0082674-78	PPGNPR0084368	PPGNPR0119274
PPGNPR0082679	PPGNPR0084369	PPGNPR0119537
PPGNPR0082680-83	PPGNPR0084370	PPGNPR0119641
PPGNPR0082684	PPGNPR0084371	PPGNPR0119666
PPGNPR0082688	PPGNPR0084372	PPGNPR0123831
PPGNPR0082689	PPGNPR0084373-76	PPGNPR0123936
PPGNPR0082690	PPGNPR0084377-78	PPGNPR0123984
PPGNPR0082691-97	PPGNPR0084379	PPGNPR0124035
PPGNPR0082699	PPGNPR0084380	PPGNPR0124158
PPGNPR0084201	PPGNPR0084381-83	PPGNPR0124281
PPGNPR0084301-08	PPGNPR0084384-550	PPGNPR0126337
PPGNPR0084309-10	PPGNPR0084551	PPGNPR0127596
PPGNPR0084311-12	PPGNPR0084552-61	PPGNPR0137875
PPGNPR0084313-16	PPGNPR0084562-77	PPGNPR0137924
PPGNPR0084317	PPGNPR0084578	PPGNPR0139708
PPGNPR0084318	PPGNPR0084579-87	PPGNPR0139831
PPGNPR0084319-26	PPGNPR0084588-99	PPGNPR0139882
PPGNPR0084327-28	PPGNPR0089164-73	PPGNPR0139986
PPGNPR0084329-30	PPGNPR0099799	PPGNPR0140034
PPGNPR0084331-34	PPGNPR0100598	PPGNPR0140057

PPGNPR0140074	PPGNPR0557501	PPGNPR0558927
PPGNPR0144123	PPGNPR0557518	PPGNPR0558968
PPGNPR0144988	PPGNPR0557522	PPGNPR0559316-20
PPGNPR0148832	PPGNPR0557607.001	PPGNPR0559359
PPGNPR0149429	PPGNPR0557642	PPGNPR0559427
PPGNPR0150627	PPGNPR0557643-54	PPGNPR0559492
PPGNPR0155165	PPGNPR0557655-67	PPGNPR0559589
PPGNPR0156965	PPGNPR0557668-71	PPGNPR0559880
PPGNPR0168934	PPGNPR0557672-76	PPGNPR0560009
PPGNPR0169000	PPGNPR0557677-78	PPGNPR0560080
PPGNPR0173409	PPGNPR0557679-81	PPGNPR0560155
PPGNPR0173423	PPGNPR0557682-86	PPGNPR0560164
PPGNPR0173446	PPGNPR0557687-90	PPGNPR0560193
PPGNPR0174587	PPGNPR0557691-94	PPGNPR0560224-27
PPGNPR0176415	PPGNPR0557695-96	PPGNPR0560228-36
PPGNPR0176883	PPGNPR0557697-98	PPGNPR0560237-41
PPGNPR0177179	PPGNPR0557699-700	PPGNPR0560242-45
PPGNPR0178381	PPGNPR0557701-02	PPGNPR0560342
PPGNPR0178453	PPGNPR0557703-06	PPGNPR0610886
PPGNPR0178516	PPGNPR0557707-10	PPGNPR0610932
PPGNPR0180963	PPGNPR0557711-14	PPGNPR0611092-96
PPGNPR0181037	PPGNPR0557715-18	PPGNPR0611102
PPGNPR0181471	PPGNPR0557719-20	PPGNPR0611148-60
PPGNPR0181556	PPGNPR0557721-24	PPGNPR0611180-88
PPGNPR0182025	PPGNPR0557725-28	PPGNPR0611189-94
PPGNPR0184822	PPGNPR0557729-32	PPGNPR0611428
PPGNPR0185183	PPGNPR0557733-36	PPGNPR0611607
PPGNPR0185816	PPGNPR0557737-38	PPGNPR0612254
PPGNPR0186116	PPGNPR0558041	PPGNPR0612648-49
PPGNPR0557474	PPGNPR0558093	PPGNPR0612650-53
PPGNPR0557475	PPGNPR0558403	PPGNPR0612782-85
PPGNPR0557476	PPGNPR0558427	PPGNPR0637887
PPGNPR0557478	PPGNPR0558537	PPGNPR0657921
PPGNPR0557480	PPGNPR0558661	PPGNPR0659872
PPGNPR0557482	PPGNPR0558687	PPGNPR0659897
PPGNPR0557484	PPGNPR0558700	PPGNPR0659907
PPGNPR0557486	PPGNPR0558743	PPGNPR0659910
PPGNPR0557496	PPGNPR0558803	PPGNPR0659931
PPGNPR0557498	PPGNPR0558829	PPGNPR0659954
PPGNPR0557500	PPGNPR0558841	PPGNPR0659977

PPGNPR0660023	PPGNPR0714079-80	PPGNPR0813202-08
PPGNPR0660025	PPGNPR0714081	PPGNPR0813383-88
PPGNPR0660028	PPGNPR0714084	PPGNPR0813389-90
PPGNPR0660047	PPGNPR0714085-91	PPGNPR0813421-44
PPGNPR0660050	PPGNPR0714092-97	PPGNPR0813514-59
PPGNPR0660053	PPGNPR0714098-103	PPGNPR0813672-76
PPGNPR0660056	PPGNPR0714104-06	PPGNPR0813681-97
PPGNPR0660058	PPGNPR0715809	PPGNPR0813775-82
PPGNPR0660066	PPGNPR0715822-23	PPGNPR0813783-93
PPGNPR0660068	PPGNPR0715824-30	PPGNPR0813878-85
PPGNPR0660359	PPGNPR0718961	PPGNPR0813886-92
PPGNPR0660362	PPGNPR0721416-19	PPGNPR0813927
PPGNPR0660373	PPGNPR0721426-27	USNPR0000225
PPGNPR0661758	PPGNPR0721428-32	USNPR0000271
PPGNPR0675847-921	PPGNPR0721434-36	USNPR0000559-60
PPGNPR0675922-81	PPGNPR0721539	USNPR0001757
PPGNPR0679656-806	PPGNPR0721540-42	USNPR0001770
PPGNPR0679656	PPGNPR0721543	USNPR0001772
PPGNPR0680143	PPGNPR0721580	USNPR0001775
PPGNPR0680429	PPGNPR0721636-40	USNPR0001778
PPGNPR0680430	PPGNPR0721705-12	USNPR0001788
PPGNPR0682296-97	PPGNPR0721808-09	USNPR0007905
PPGNPR0685178-79	PPGNPR0721825	USNPR0009064
PPGNPR0685217-19	PPGNPR0721886-87	USNPR0009256
PPGNPR0690329	PPGNPR0721888-92	USNPR0009261
PPGNPR0698872	PPGNPR0721893-96	USNPR0009273
PPGNPR0707217-45	PPGNPR0721897-99	USNPR0012408
PPGNPR0709006	PPGNPR0721909	USNPR0012409
PPGNPR0712265-71	PPGNPR0721912-15	USNPR0012410
PPGNPR0712272-77	PPGNPR0725177	USNPR0012418
PPGNPR0713999-4000	PPGNPR0725178	USNPR0012424-31
PPGNPR0714005	PPGNPR0725194-212	USNPR0012432
PPGNPR0714006-07	PPGNPR0725213-16	USNPR0012434
PPGNPR0714008	PPGNPR0725285	USNPR0012439
PPGNPR0714026-28	PPGNPR0812773-76	USNPR0012442
PPGNPR0714029-34	PPGNPR0812777-83	USNPR0012450
PPGNPR0714070	PPGNPR0812784-92	USNPR0013592
PPGNPR0714071-72	PPGNPR0812921-23	USNPR0013593
PPGNPR0714073-74	PPGNPR0812924-81	USNPR0013594
PPGNPR0714077-78	PPGNPR0813143-69	USNPR0013836

USNPR0013837
USNPR0013840
USNPR0013841
USNPR0013842
USNPR0013843
USNPR0013844
USNPR0013845
USNPR0013846
USNPR0013847
USNPR0013848
USNPR0013849
USNPR0013850
USNPR0013851
USNPR0013852
USNPR0013853
USNPR0013854
USNPR0013855
USNPR0013856
USNPR0013857
USNPR0013858
USNPR0013859
USNPR0013860
USNPR0013861
USNPR0013862
USNPR0013863
USNPR0015127
USNPR0015149
USNPR0015150
USNPR0015197
USNPR0015198-203
USNPR0015204-207
USNPR0015208-12
USNPR0015213-25
USNPR0015226-71
USNPR0015792
USNPR0016689-764
USNPR0016778-89
USNPR0016916-20
USNPR0017808-16
USNPR0022329-602

Attachment 2

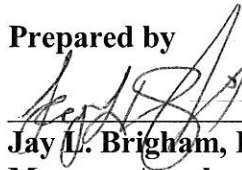
**An Expert Witness Rebuttal and Supplemental Report Concerning
the Natural Products Refining Company and Columbia-Southern
Chemical Company, 1909-1964**

PPG Industries, Inc., v. The United States of America

(No. 2:12-CV-0352 (KM)(MF))

(District of New Jersey)

Prepared by

A handwritten signature in black ink, appearing to read "Jay L. Brigham", is written over a horizontal line.

**Jay L. Brigham, Ph.D., Managing Partner
Morgan, Angel and Associates, L.L.C.
Washington, DC
January 6, 2017**

Table of Contents

I.	Introduction	1
II.	Rebuttal of Mr. Robert Zoch	2
III.	Rebuttal of Mr. David Toner	34
	Appendix 1: NPRC's Ore Purchases from the MRC	35
	Appendix 2: Worker Safety and Insurance Claims	37

I. Introduction

I have prepared this expert witness rebuttal supplemental report at the request of the Environmental Defense Section of the Environment and Natural Resources Division of the United States Department of Justice. As I noted in my expert witness report dated October 7, 2016, the Department of Justice first contacted me in March 2013 regarding this case. Morgan, Angel and Associates, LLC, and I, as the expert witness, signed a contract with the Department of Justice to review historical documents and write an expert witness report regarding the 1909 through 1963 Garfield Avenue chromium chemicals plant in Jersey City, NJ, and nearby parcels (“Sites”). Morgan, Angel and Associates is compensated at the rate of \$142 for my work on this rebuttal report.

This rebuttal and supplemental report primarily addresses the claims and arguments made by Mr. Robert M. Zoch Jr. as to both the history of overall federal regulation of the economy during both World War I and World War II, and the history of operations of the Natural Products Refining Company (“Natural Products” or “NPRC”) in those contexts. This report also addresses the assertions and opinions of Mr. David Toner regarding the purchase of NPRC by PPG in mid-1954. I have assigned numbers to the statements made by Mr. Zoch (“Zoch Statements”) on which this report focuses, and the page citations for those statements refer to the pages within Mr. Zoch’s October 7, 2016 report.

In addition to the documents cited or referenced in my October 7, 2016 report, I have considered PPGNPR1121237-2494. I also reviewed a number of depositions.¹

I may revise or supplement the opinions and their bases therefor expressed in my October 7, 2016 Report and in this Rebuttal and Supplemental Report based on any expert rebuttal and supplemental reports submitted on behalf of PPG in this case, documents that PPG may produce hereafter in this litigation, the deposition and trial testimony offered by other experts on behalf of the United States herein or by experts on behalf of PPG, and research made necessary by any of the foregoing.

¹ Deposition of C. Milczarek, Jersey City Development Authority, v. PPG et al., 3/27/1987, PPGNPR0067542-683; Deposition of S. Kuis, PGF Industries v. Evanston Insurance Company, et al., 1/30/1989, PPGNPR0840345-459; Deposition of H. Robertson, Hoffman et al., v. Totaro and Totaro v. City of Jersey City et al., 11/21/1990 and 11/30/1990, PPGNPR0155623-87 and PPGNPR1055688-742; Deposition of W. Carlin, Exxon v. PPG et al., 5/16/1991, PPGNPR0060548-647; Deposition of H. Stack, Exxon v. PPG, 8/6/1991, PPGNPR0662416-506; Deposition of S. Spitale, Exxon v. PPG, 8/20/1991, PPGNPR0662573-631; Deposition of J. Kaplan, Exxon v PPG, 3/4/1992, PPGNPR00691170-279; Deposition of G. Sanguinetti, PPG v. Accident and Casualty Insurance Company, 10/7/1997, PPGNPR0671836-990.

II. Rebuttal of Mr. Robert Zoch

In his expert witness report dated October 7, 2016, Mr. Zoch offers numerous statements, assertions, and / or opinions. I respectfully disagree with a substantial number of them.² The bases for my disagreements with Mr. Zoch's statements, assertions, or opinions fall into the following general categories:

- > Statements, assertions, and / or opinions lack a citation to a primary or secondary source, or both and are speculative in nature.
- > The cited document(s) does not support the statement, assertion, and / or opinion.
- > Statements, assertions, and / or opinions are contrary to available historical evidence or opinions of established historians.
- > Statement, assertions, and / or opinions that are not derived using accepted historical methodology.
- > Opinions are legal in nature and beyond the scope of a historian's training.
- > Statement, assertions, and / or opinions are vague, unclear, or otherwise ambiguous.
- > Statements, assertions, and / or opinions that are irrelevant.

Zoch Statement 1, page 1: "the importance of primary chromium chemical products in support of the U.S. military during the World Wars."

This statement is irrelevant as the importance of chromium chemicals does not shed light on the acts, omissions, duties, or responsibilities of any party in this litigation. This statement is vague and overblown. Thousands (at least) of other substances and materials were also deemed "important" to the military during wartime.

² Expert Report of Robert M. Zoch, Jr., P.E., 10/7/2016, PPG Industries, Inc., v. United States of America, et al., United States District Court for the District of New Jersey, CA No. 2:12-cv-03526 (JMV)(MAH), ("Zoch Report").

Zoch Statement 2, page 1: “assist the Court in evaluating the liability of parties responsible for contamination of the Site.”

This assertion by Mr. Zoch is legal in nature and beyond the scope of a historian’s training.

Zoch Statement 3, page 2: “Similarly, the absence of pertinent documentation in the government archives could be explained by documents being misfiled, subjected to unauthorized disposition, or unavailability for public access.”

This statement is inconsistent with accepted historical methodology and is speculative in nature.

Although historians sometimes confront incomplete records, there is no reason to believe that in the current litigation all extant documents have not been located. There is also no reason to believe in the current litigation that there has been any “unauthorized disposition” of any relevant documents. Further, there is no evidence to suggest that the National Archives and Records Administration has classified documents relevant to this case in its holdings. Natural Products’ participation in WWII era government programs was limited to the purchase of chromite via the Metal Reserve Company (“MRC”) and some participation in advisory boards. Additionally, as part of the government’s general oversight of the wartime economy, wartime agencies received production and cost data from Natural Products. However, there is no reason to believe that government archives would contain documents related to NPRC’s production decisions, employment and management decisions, or documents concerning other facets of daily plant operations. There is no reason to believe that the government would have kept records of NPRC’s production during the interwar period or after the end of World War II through the PPG sale of the plant in the early 1960s.

Zoch Statement 4, page 4: “I have also reviewed . . . World War II treatises from my library.”

A professionally trained historian would provide specific citations to such works. Failure to do so is inconsistent with accepted historical methodology.

Zoch Statement 5, page 4: “I also visited the Site on two occasions in July 2011 and April 2016.”

This statement is irrelevant to determining what occurred at the Site during World War I or World War II, as no information relating to the acts, omissions, duties or responsibilities of any party in this litigation at the Site is described as having been revealed by such visits.

Zoch Statement 6, page 4: “I have communicated with Mr. Randall Grip of Aero Data Corporation regarding the interpretation of specific features observed on historical aerial photographs of the Site.”

Mr. Zoch provides no indication of the contents of such communications, and fails to state whether they duplicated or go beyond the contents of Mr. Grip’s October 7, 2016 report.

Zoch Statement 7, pages 4-6: Statement of “Credentials.”

There is nothing in Mr. Zoch’s Statement of “Credentials” to indicate any training or qualifications as a professional historian.

Zoch Statement 8, page 6: “The Site at issue in this litigation was operated as a chromite ore processing plant with ancillary ore tailings piles for approximately 53 years from 1910 through mid-1963 (the ‘Relevant Time Period’ of Operations).”

This statement is contrary to available primary historical evidence relating to the period of operations of the Garfield Avenue plant. Documents date the start of plant operations to 1909, rather than 1910.³

Zoch Statement 9, pages 8-11: Mr. Zoch provides an overview of the “U.S. Chromium Chemicals Industry.”

This overview is contrary to available historical evidence and opinions of established historians. Although Mr. Zoch is presenting overview, he is blurring together five distinct periods in United States history: the pre-World War I period, World War I, the inter-war period—including the Great Depression—World War II, and the post-World War II years or 1946 through 1963. The American economy and government regulations were different in each of these five periods and must be viewed separately within the changing historical context.⁴

³ Expert Report of Jay L. Brigham, 10/7/2016, PPG Industries, Inc., v. United States of America, et al., United States District Court for the District of New Jersey, CA No. 2:12-cv-0352 (JMV)(MAH), (“Brigham Report”), 2-4. Also see, Pittsburgh Plate Glass Company, Stock Listing, 7/15/1954, PPGNPR0089439-49, at PPGNPR0089447.

⁴ In P. Boyer, et al., *The Enduring Vision, A History of the American People*, vol. 2 (Lexington, MA: D.C. Heath and Company, 1996), the authors devoted separate sections to the “Progressive Era,” “World War I,” “The 1920s,” “Crash, Depression, and New Deal,” “American Life in a Decade of Crisis at Home and Aboard,” “Waging Global War, 1939-1945,” and “Cold War America, 1945-1952,” xxi-xxvii. Historian Paul Koistinen in his multivolume work on the history of the political economy of American warfare devotes all or part of four volumes on the period from 1909 to 1964. See, P. Koistinen, *Mobilizing for Modern War, The Political Economy of American Warfare, 1865-1919* (Lawrence, KS: University Press of Kansas, 1997); P. Koistinen, *Planning War, Pursuing Peace, The Political Economy of American Warfare, 1920-1939* (Lawrence, KS: University Press of Kansas, 1998); P. Koistinen, *Arsenal of World War II, The Political Economy of American Warfare, 1940-1945* (Lawrence, KS: University Press of Kansas, 2004); and P. Koistinen, *State of War, The Political Economy of American Warfare, 1945-2011* (Lawrence, KS: University Press of Kansas, 2012).

Zoch Statement 10, pages 9-10: “[T]hese five companies controlled production of chromium chemicals in the United States, with their approximate manufacturing capacities near the beginning [1942] and end of the war [1944] shown as follows:”

This statement is inaccurate in its characterizations of the beginning and the end of World War II.

Zoch Statement 11, page 11: “After studies by PPG during the early 1960s concluded that the NPR plant could not be economically expanded, it was decided to build a new chromium chemicals plant in Corpus Christi, Texas.”

This statement is contrary to the available corporate documents. In the mid-1950s, PPG started to study the possible improvements at the Jersey City plant. However, the results of those findings led PPG to forgo plant expansion in Jersey City after 1957. In the fall of 1959, PPG instead decided to construct a plant in Corpus Christi, TX.⁵

Zoch Statement 12, page 12: “This technique produced approximately 30 tons/day of sodium bichromate, similar to the prior NPR production rate.” In footnote 41, Mr. Zoch wrote “although this likely increased to 40 tons/day when the fourth kiln went into full operation sometime soon after the PPG purchase.”

There is no evidence supporting this assertion that PPG added the fourth kiln, although Mr. Zoch is correct that PPG purchased NPRC.⁶ In fact, it was NPRC that added the fourth kiln shortly before PPG purchased the plant.⁷ It is not certain that the fourth kiln increased production to 40 tons per day.

Zoch Statement 13, pages 12-13, footnote 43: “My review of the deposition testimony of Dr. Jay Brigham, the Government’s Rule 30(b)(6) Corporate Designee in this matter, taken June 27 and 28, 2016 (hereinafter ‘Brigham Dep.’) demonstrates that my interpretation of relevant documents and recitation of the historical framework surrounding the relevant war time events is generally consistent with that of the United States.”

⁵ Brigham Report, 89-90.

⁶ Brigham Report, 87.

⁷ PPG’s 30(b)(6) deponent testified that no kilns were installed at the Jersey City plant between mid-1954 and 1963. See, Deposition of M. Terril, PPG Industries, Inc., v. United States of America, et al., United States District Court for the District of New Jersey, CA No. 2:12-cv-03526 (JMV)(MAH), 4/14/2015, 115. Also see, Pittsburgh Plate Glass Company, Stock Listing, 7/15/1954, PPGNPR0089439-49, at PPGNPR0089447.

I disagree with this statement. To the contrary, upon reading Mr. Zoch's expert witness report I believe that he and I have very different interpretations of the historical documentation and the relevant war time events. This rebuttal report attempts to identify the major reasons why Mr. Zoch's report lacks substance or credibility in numerous respects, and the numerous instances in which Mr. Zoch is incorrect.

Zoch Statement 14, page 13: "At that time, there was no perception that the war in Europe would involve the U.S. except for the supply of necessary war materials to our Allies . . ."

Zoch Statement 15, page 13: "Then, to help meet our European Allies' wartime needs, NPR expanded its chromium chemicals processing plant in 1915."

Statements 14 and 15 are contrary to available historical evidence and opinions of established historians. In fact, under President Woodrow Wilson the United States remained officially neutral for most of World War I. It was not until April 6, 1917, after Germany's renewal of unrestricted naval warfare, that President Wilson asked Congress for a declaration of war.⁸ Mr. Zoch cites no basis for any alleged "perception" of the purpose for any 1915 Natural Products plant expansion. Mr. Zoch's cited historical references regarding World War I, and the other documents that Mr. Zoch cites, do not support his claims and do not establish any Government directives, orders, or mandates during World War I relating to NPRC. Mr. Zoch cites to an excerpt from an article in *The Journal of Industrial and Engineering Chemistry* that merely states, "During 1915, the Natural Products Refining Company, of Jersey City, N.J., enlarged its dichromate plant at a cost of about \$50,000."⁹

Zoch Statement 16, page 14: "Armed with a letter of authorization from President Wilson dated March 4, 1918, Baruch then assumed the chairmanship of the War Industries Board. The Board quickly established new methods of government control over almost everything that was used and produced during World War I by the 28,000 manufacturing plants included in the government's inventory."

This statement is contrary to the opinions of established historians. In this section of his report, Mr. Zoch overstates the authority actually given to Bernard Baruch and the power exerted by the Federal government over the wartime economy. The War Industries Board ("WIB") and predecessor agencies in fact relied on the voluntary cooperation of American business and

⁸ Brigham Report, 5.

⁹ *The Journal of Industrial and Engineering Chemistry*, vol. 8, no. 6, PPGNPR0016033-35, footnote on PPGNRP0016033.

industry to expand wartime production.¹⁰ As Mr. Zoch notes, President Wilson appointed Baruch in March 1918 and approximately eight months later the war ended on November 11, 1918. The eight months that Baruch headed the WIB is considerably shorter than the four plus years that the war lasted.

Zoch Statement 17, page 14: “It was proposed that a skeleton of the War Industries Board, administered by the centralized purchasing bureaus of the Army and Navy, could fill that role.”

This statement is irrelevant. Baruch’s proposed “skeleton of the War Industries Board” never developed. Although stockpiling was studied, and the Under Secretary of War was given responsibility for preparedness, nothing really happened in this regard in the 1920s. Numerous, and ineffective, Industrial Mobilization Plans, were written in the 1930s.¹¹

Zoch Statement 18, page 16: “By September 1941, three months before the U.S. entered World War II, the government was purchasing all the available chromite offered anywhere in the world as well as all available domestic ore production.”

This statement is incorrect as Mr. Zoch mischaracterizes the cited document. The document reads, in part, “[t]he Government is purchasing all the available surplus chromite offered anywhere in the world, permitting the consuming industries in this country to take what they wish first.”¹² Thus the government was purchasing surplus inventory and making it available to American industry, or stockpiling it. Other documents cited by Mr. Zoch either contradict or fail to support his claims.¹³

Zoch Statement 19, page 16: “Private purchasing agreements had previously been utilized to provide a dependable source of ore feedstocks, and inventories were maintained by the producers for delay contingencies in shipment and receipt from the primary sources of chemical grade chromite ore in South Africa and the Philippines, NPR was identified as having a sufficient chromite ore inventory for operations through 1943.”

¹⁰ Brigham Report, 7-10. Baruch himself wrote, “[t]here would be no hesitation anywhere in acquiescing in restrictions affecting fortunes or freedom. The only question was what restrictions were going to be necessary and how they ought to be applied.” See, B. Baruch, *The War Industries Board* (New York, Prentice-Hall, Inc., 1941), 16. In his study spanning 1865-1919, Koistinen wrote of World War I, [t]hrough the board [WIB] centralized control over a planned economy was established and carried out by representatives of the government, the business community, and the military. . . Civilian and military, private and public activities once again combined, Koistinen, *Mobilizing for Modern War*, 4.

¹¹ Brigham Report, 23.

¹² A. Leith, The Chromite Program, 9/5/1941, PPGNPR0610505-10, at PPGNPR0610508.

¹³ A. Leith to G. Moffett, 5/6/1941, PPGNPR0000349-52.

This statement is incorrect as Mr. Zoch mischaracterizes the cited document. The document reads, in part, “the Natural Products Refining Company having sufficient amounts to continue operations through 1943. This company, however, is negotiating the purchase of ore (50%) from mines in North Carolina which it is confident will be as satisfactory as the imported kind.”¹⁴ As the sentence underscores, NPRC continued to search for private sources of chromite into 1943. Natural Products first purchased ore from the MRC in 1943 and those purchases continued into 1946 (see Appendix 1).

Mr. Zoch cites no evidence that the Government chromite ore stockpiling program had any bearing on NPRC’s production processes or waste management operations within the Plant. None of the evidence cited by Mr. Zoch, or any documentation that I have been able to find, indicates that the government’s ore stockpiling program had any discernable impact on NPRC’s production processes, products, waste management, or ability to conduct business as usual.

Zoch Statement 20, page 17: “Mr. Baruch remained a consistent advocate of planning for another war emergency and, when World War II became a reality, President Roosevelt called upon him to resolve raw material and equipment allocation issues between the burgeoning U.S. synthetic Rubber Program and the equally important aviation gasoline program. Mr. Baruch headed the Rubber Survey Committee, recommending that the rubber program be consolidated under the War Production Board, and remained a trusted advisor and confidant of the President. Although he did not accept a formal position in the Roosevelt administration, his ideas for a superagency similar to the War Industries Board he managed during World War I are evident in what became the War Production Board during World War II.”

This statement is contrary to available historical evidence and the opinions of established historians. Mr. Zoch overstates Bernard Baruch’s importance during World War II and his importance to President Roosevelt. Mr. Zoch also speculates as to what role, if any, Mr. Baruch’s ideas played in the eventual creation of the War Production Board. Roosevelt’s relationship to Baruch has been described as “distinctively cool” and one in which Roosevelt preferred to “consult with Baruch rather than rely on him.”¹⁵

Zoch Statement 21, pages 17-18: “World War II controls over the U.S. chromium industry began on July 7, 1941, with the Office of Production Management (‘OPM’) placing chromium under full priority control . . .”

¹⁴ L. James, “Protective Coatings Unit,” F. Bramble, *Economic Brief on Chromates and Bichromates*, n.d., PPGNPR0560292-341, at PPGNPR0560307.

¹⁵ “Baruch, Bernard Mannes,” in O. Graham, Jr. and M. Robinson Wander *Franklin D. Roosevelt, His Life and times, An Encyclopedic View* (Boston, G.K. Hill & Co., 1985), 23.

I question Mr. Zoch's training as a professional chemical engineer to discuss price regulations specifically and the World War II economy and federal regulations generally.

Zoch Statement 22, page 26: "Data from PPG operations demonstrates ore yields of soluble constituents ranging from approximately 75 to 81%; however, during World War II, there is an indication that the NPR ore conversion efficiency may have dropped to as low as 60%."

This assertion is contrary to available historical evidence. Although it is beyond the area of my expertise to comment on the "science" of ore roasting, it is within my area of expertise to comment on Mr. Zoch's use of historical documents. In this section Mr. Zoch discusses three documents including one dated February 7, 1944. Citing to this document Mr. Zoch wrote, "during World War II, there is an indication that the NPRC ore conversion efficiency may have dropped to as low as 60%." This is not only a speculative statement, but the cited document does not support this assertion. The document in question addressed the developing shortage of sodium bichromate that the War Production Board ("WPB") anticipated would grow through the late summer. The document's author wrote,

[t]he best way to increase output *appears* to be to run more ore thru the plants at a reduced recovery. Ordinarily recovery is 85%; it *might* drop to 60%, but *would* leave a probably marketable sludge which under usual conditions is retreated. Under the proposed scheme it *would* be stockpiled for the present. Thus 40% to 50% more output could be secured.¹⁶ (Emphasis added.)

Mr. Zoch's 60% figure comes from a planning document and does not discuss whether any of this actually happened at Natural Products or at the other five plants engaged in sodium bichromate production.

Zoch Statement 23, page 26: "A significant on-Site fill area is identified as the former Morris Canal that traversed the plant property from northeast to southwest, parallel with Garfield Avenue."

While there is no dispute that NPRC filled the canal with mud, Mr. Zoch ignores information as to when this occurred and the fact that there is no indication of any Federal government participation in NPRC's decision to fill or in the filling of the portions of the canal on NPRC property and elsewhere.¹⁷

¹⁶ H. Neal, Meeting of Chemicals Bureau, Inorganic Section, WPB, 2/7/1944, PPGNPR0001881.

¹⁷ Brigham Report, 3-4.

Zoch Statement 24, pages 28-42: “4.0 CERCLA Liability of the United States, A finding of liability under CERCLA requires a fact intensive determination that . . .”

Such discussions are legal opinions and beyond the training of professional historians.

Zoch Statement 25, pages 29-30: “Since the primary feedstock for producing chromium chemicals and products upon which they relied was sodium bichromate, the five companies producing that material were under significant scrutiny.”

This statement is vague and ambiguous as to the meaning of “under significant scrutiny.” As I discussed in my expert witness report, NPRC representatives interacted and corresponded with officials from the WPB and MRC, and other Federal agencies. Without an analysis of such interactions, a historian would not offer an opinion as to whether or not they rise to the level of “significant scrutiny.”¹⁸

Zoch Statement 26, page 30: “At that time [October 1, 1943] it was observed that labor problems at the plants had been eased and that the chemical grade ore supply was sufficient.”

This statement is contrary to available historical evidence and opinions of established historians. Mr. Zoch correctly states that sodium bichromate shortage started to develop in the fall of 1943, with the completion of the aircraft industry’s expansion being the primary reason. However, I disagree with Mr. Zoch’s assertion that the labor situation had improved at the plants producing sodium bichromate. In fact, the labor shortage in the sodium bichromate plants remained acute through the end of the war.¹⁹ The February 7, 1944 document that Mr. Zoch cited in his discussion of reduced recovery underscores this point,

A shortage of chromate is developing which will be acute for the next half year. The difficulty is aggravated by labor shortage in an industry that is not healthful and where labor at any time is hard to get . . .²⁰

¹⁸ Brigham Report, 30-32, 47-49, and 52.

¹⁹ Brigham Report, 41. Maury Klein in his recent book on World War II mobilization called the labor shortage during the war, “that seemingly unstoppable riddle,” M. Klien, *A Call to Arms, Mobilizing America For World War II* (New York, Bloomsbury Press, 2013), 688.

²⁰ H. Neal, Meeting of Chemicals Bureau, Inorganic Section, WPB, 2/7/1944, PPGNPR0001881. Brigham Report, 52-53 and 56.

As I wrote in my expert witness report, a March 1945,²¹

WPB memorandum discussed the possibility of strikes in the chrome chemical industry and the author noted that ‘labor in bichromate plants continues in an unrestful state because of the inherent health hazards and of, greater importance, the fact that wage scales in some of the plants are below the prevailing rates in other industries in the vicinity of the plants.’²² As of July 1945, near the end of the war, it remained difficult to hire men for chromium chemical plants ‘because of the toxic conditions in the plants.’²³

Zoch Statement 27, page 30: “At the time, the best option for increasing output appeared to be based upon processing more chromite ore through the six plants at a reduced recovery rate. This is a technique sometimes referred to as ‘cream skimming,’ and a procedure utilized at other primary metals processing facilities during World War II to increase production.”

This is a speculative statement. It is also incorrect, since the Garfield Avenue plant was not a metal processing facility but rather a chemical manufacturing facility. See also the response to Statements 30 and 31 below.

Zoch Statement 28, page 31: “To provide some financial relief to the companies, it was suggested that the Metals Reserve Company (“MRC”) could sell chromite ore below the established ceiling price and take title to the low grade sludge produced by the cream skimming operation for recovery of its residual chromium value after the War. An alternative for the Army or Navy to subsidize the process modification was also suggested in view of the fact that 85% of the product was for military use.”

This is a speculative and questionable set of statements since the evidence does not show that the “suggest[ions]” were ever implemented with respect to Natural Products, or at any other chromium chemicals manufacturer. See also the response to Statements 30 and 31 below.

Zoch Statement 29, page 31: “After visiting the four largest producers, however, it was recommended that the optimum resolution of the shortage could be accomplished by:

- adding furnace capacity at the Martin Dennis plant;
- utilizing higher grade ores at the Mutual and Diamond plants; and

²¹ Brigham Report, 69.

²² J. Wizeman to Executive Committee, Chemicals Bureau, WPB, 3/5/1945, PPGNPR0008826-28, at PPGNPR0008827.

²³ J. Gould to M Preston, 7/20/1945, USNPR0011096-97, at USNPR0011097.

- having only NPR eliminate ore reworking, with purchase of the resulting sludge from its plant by the MRC.”

This is a speculative and misleading statement since the evidence does not show that the “recommend[ation]” with respect to Natural Products was ever implemented. See also the response to Statements 30 and 31 below.

Zoch Statement 30, page 33: “Agreements were entered into with four of the five producers effective May 31, 1944, with the final producer (NPR) entering into a subsidy agreement on June 2, 1944. It has been determined that the four companies that agreed to subsidies on May 31 participated in the high grade ore program at a total reimbursed cost of \$300,574.”

“No copies of the subsidy agreements for any of the chromium producers have been discovered by PPG researchers to date. They may have been lost, misfiled, destroyed or simply not available to the public. Given the significant passage of time since these subsidy arrangements were made, such a result is not surprising.”

Zoch Statements 28 through 30 are contrary to the available historical evidence. As discussed in the extant documents, the MRC only sold the high-grade ore to the four companies. A review of MRC-Natural Products contracts shows that Natural Products only purchased South African Transvaal Ore from the MRC. Natural Products did not purchase higher grade Russian ore.²⁴

The primary document that Mr. Zoch cited in his report to support these statements is an August 21, 1947 memorandum from the Office of Defense Supplies of the Reconstruction Finance Corporation. Mr. Zoch rounded the payment to \$300,574, although in the document the exact amount given is \$300,574.53.²⁵ Accompanying the memorandum was a list of the five sodium bichromate producers in the following order: Diamond Alkali Company, Imperial Paper & Color Corporation, Martin Dennis Company, Mutual Chemical Company of America, and Natural Products Refining Company. The third and fourth paragraph of the Office of Defense Supplies memorandum read,

There is attached hereto a list of agreements with producers of sodium bichromate. These agreements provided that complete inventory and cost records should be kept, and that Defense Supplies Corporation should be permitted to examine such records at any time within one year from the date of the last payment thereunder.

²⁴ See Appendix 1 for a listing of MRC-Natural Products Contracts.

²⁵ H. Brite, Memorandum to the Directors, 8/21/1947, COMP0000760-62, at COMP0000760.

Claims were presented by the first four producers totaling the above amount, and were paid in full subject to verification. All of the high grade chrome ore was purchased from Metals Reserve Company, and the costs were verified by the Auditing Division with the records of Metals Reserve Company.²⁶

Read together, and with the attached list of companies, it is apparent that Natural Products signed an agreement that would have enabled it to participate in this program, but that Natural Products ultimately did not participate. It did not present a claim for reimbursement or otherwise participate in the reimbursement program. Extant documentation supports this statement. As I wrote in my expert report, in June 1944, S. Stanton of Natural Products wrote to the MRC and said that Natural Products had no high grade ore and did not plan to acquire any high grade ore. Additionally, in June 1945, when the MRC auditor reported on ore purchases under the program, Natural Products was not among the four companies listed.²⁷ The June 20, 1945, memorandum that the MRC auditor wrote listed the four companies that participated in the program (Natural Products was not on the list) and stated that the “[t]otal [a]mount of claims paid,” was \$300,574.53, the exact amount contained in the August 21, 1947 document that Mr. Zoch referenced.²⁸

Unlike Mr. Zoch, a professional historian would not assume under circumstances such as these that evidence that Natural Products did in fact participate in this program “may have been lost, misfiled, destroyed or simply not available to the public.” Mr. Zoch, without factual basis, assumes that the lack of evidence suggests that it never existed.

²⁶ H. Brite, Memorandum to the Directors, 8/21/1947, COMP0000760-62. This document also is bates numbered: PPGNPR0010820-22. The DSC resolution approving the program was dated 5/29/1944. See, Resolution of Defense Supplies Corporation, Re: Sodium Bichromate, COMP0000759-80. A DSC document dated 6/20/1945 lists the four companies—Diamond Alkali, Imperial Paper, Martin Dennis, and Mutual Chemical—and their total claims that equaled \$300,574.53. See Memorandum to Mr. Samuel H. Sabin, Vice President, DSC, 6/20/1945, PPGNPR0010838-39. On July 3 and 4, 1944, the DSC sent identical letters to all five producers of bichromate modifying the DSC’s letter of May 31, 1944 “by deleting the provision permitting cancelation prior to October 31, 1944” on thirty days’ notice. However, by early July 1944, NPRC had already informed the DSC that it had no plans to purchase higher grade ore. See, S. Sabin to Martin Dennis Company, 7/4/1944, PPGNPR0010881; S. Sabin to Natural Products Refining Co., 7/4/1944, PPGNPR0010882; S. Sabin to Mutual Chemical Corp. of America, 7/4/1944, PPGNPR0010883; S. Sabin to Imperial Paper & Color Corp., 7/3/1944, PPGNPR0010884; and S. Sabin to Diamond Alkali Company, 7/3/1944, PPGNPR0010885. The history of chrome chemicals written shortly after Japan surrendered briefly mentioned the subsidy program, W. Healey, “History – Chrome Chemicals,” 9/7/1945, COMP0000848-873, at COMP0000858. This history is also at, PPGNPR0008669-94 and PPGNPR0015245-71.

²⁷ Brigham Report, 55-56.

²⁸ Brigham Report, 52-57; and N. Royall, Memorandum to Mr. Sabin, 6/20/1945, PPGNPR0015476-78, at PPGNPR0015477.

Zoch Statement 31, page 30: “By January 1944, two potential methods to increase production were under investigation.

- construct a new chromium chemicals plant requiring an estimated 8 to 10 months schedule. . .

This statement is vague in that Mr. Zoch fails to address the fact that the five companies objected to plant expansion fearing additional post war competition might lower their revenues and profits. Mr. Zoch also does not address that the five producers conspired to fix prices and restrain trade in the 1930s.²⁹

On June 26, 1942, NPRC, its president Harry A. Goman, vice president Stanley L. Weil, and E. Deutz, as well as Mutual, Prior, and Martin Dennis, and a number of their executives were indicted by a Grand Jury in the Northern District of Indiana. The criminal indictment alleged that from 1933 onward, they had conspired to fix prices for bichromates in violation of the Sherman Act. The criminal indictment alleged that for the prior nine years the defendants had “knowingly and continuously engaged in a wrongful combination and conspiracy” in restraint of trade “to fix, control, stabilize, and peg prices for the sale of bichromates in interstate trade and commerce throughout the United States.”³⁰ The alleged conspiracy consisted of, among other things, a continuing agreement and concert of action among the defendants to “control the quantity of bichromates produced within the United States.”³¹

On October 1, 1942, at the request of the War and Navy Departments, the United States moved for the suspension and postponement of the prosecution of the defendants named in the Northern District of Indiana June 26 Sherman Act indictment “for the duration of the war.”³² On July 23, 1945, the US District Court for the Northern District of Indiana entered the Sherman Antitrust Act Section 1 guilty convictions of Mutual Chemical Company, Prior Chemical Company, NPRC, and Martin Dennis, on their pleas of *nolo contendere* and ordered that each pay a \$5,000 fine.³³

²⁹ Brigham Report, 56.

³⁰ United States of America v. Mutual Chemical Company of America, et al., District Court of the United States for the Northern District of Indiana, South Bend Division, 6/26/1942, USNPR0000637-45, at USNPR0000643.

³¹ United States of America v. Mutual Chemical Company of America, et al., District Court of the United States for the Northern District of Indiana, South Bend Division, 6/26/1942, USNPR0000637-45, at USNPR0000644.

³² District Court of the United States for the Northern District of Indiana, United States of America v. Mutual Chemical Company of America, et al., Motion for Postponement, 10/1/1942, USNPR0007340-42, at USNPR0007341.

³³ District Court of the United States for the Northern District of Indiana, United States of America v. Mutual Chemical Company of America, et al, 7/23/1945, USNPR0007261-62.

Nonetheless, discussions took place regarding construction of new facilities. Labor availability was usually a factor in those discussions. For example, a January 17, 1944, WPB press release stated: “[l]ack of sufficient manpower is the chief factor in the way of expanded production of critically needed sodium bichromate, members of the Primary Chromium Chemicals Producers Industry Advisory committee reported at a meeting with War Production Board representatives, it was announced by WPB today.”³⁴ The press release also stated: “[s]hut downs of equipment for lack of maintenance men were a factor in limiting production, an industry member revealed. In addition, most of the production facilities are located in critical labor market areas.” However, the press release continued: “[a] suggestion for the building of new chromium chemical plants in less critical labor areas in order to assure additional output, particularly for the military program, did not meet with the committee’s approval. Members pointed out that it would take about a year to put a new plant into operation and that necessary facilities such as furnaces and kilns were difficult to obtain, even with high priorities.” Finally, the press release stated: “[a] task group will be named to study various problems of production, manpower and costs and make recommendations to the WPB and the Office of Price Administration”(“OPA”).³⁵

Government officials and company representatives periodically discussed plant expansion and conversion of plants to manufacture bichromate, although not all producers agreed with or were interested in such expansion. The government did not force expansion on the chrome chemical industry. For example, at a February 9, 1944 WPB Primary Chromium Chemicals Industry Advisory Committee Meeting, participants discussed the chrome chemical situation and industry. Wizeman, who chaired the meeting, reported,

[c]hrome chemical producers, for competitive reasons, do not want any new plants built in this country. They feel that additional facilities approved at present would come into production too late for the [wartime] requirement, therefore, we have not authorized new construction.³⁶

Nearly a year later on January 22, 1945, at a Primary Chromium Chemicals Industrial Advisory Committee meeting, NPRC and Imperial Paper and Color Company voiced no interest in increasing plant capacity. Mutual Chemical and Diamond Alkali, on the other hand, had submitted project plans for facility expansion in non-critical labor areas while Martin Dennis was

³⁴ WPB Press Release, 1/17/1944, PPGNPR0813136-37.

³⁵ WPB Press Release, 1/17/1944, PPGNPR0813136-37.

³⁶ Primary Chromium Chemicals Meeting, 2/9/1944, PPGNPR0008745-51, at PPGNPR0008746, and Brigham Report, 56.

considering adding new equipment.³⁷ An April 13, 1945 WPB Memorandum noted that three chrome chemicals manufactures were expanding facilities while two were not. The two that did not expand were NPRC and Imperial Paper and Color Corporation.³⁸ While the Government and Mutual Chemical agreed in late July 1945 to have the latter convert a facility in Lake Charles, LA – a non-critical labor supply area – for the manufacture of chromium chemicals, the project was not completed and was abandoned with the end of the war in August 1945.³⁹

Zoch Statement 32, page 34: “In my opinion, it is more likely than not that NPR entered into some form of contract or agreement, possibly with the military (e.g., the Navy as part of their stockpile authorization or the Army Service Forces) or with the DSC, to subsidize process modifications of its ore roasting operation because . . .”

As I have discussed, the documents that Mr. Zoch cited do not support a conclusion that Natural Products participated in the subsidy program, and I have found nothing else to support this speculative statement.

Zoch Statement 33, page 35:

- [O]nly 30% of the authorized subsidy amount was utilized for the high grade ore substitution portion of the program, potentially providing adequate funds for the proposed NPR subsidy; and
- although the subsidy program for use of high grade ore was not considered a success and was terminated after 5 months, the NPR process modification resulted in NPR being the only producer to meet its ore consumption quota in 1944.

There is no evidence suggesting that such funds were provided to NPRC. Documents collected in the current litigation that do discuss *other* companies’ participation in the subsidy program and purchase of Russian ore, do not mention any participation by NPRC. (Emphasis added.) In early July 1944, for example, Mutual Chemical wrote the MRC and said that although using Russian ore presented challenges that Mutual wanted to contract for 2,000 tons of

³⁷ WPB, Memorandum, 3/5/1945, PPGNPR0008826-28.

³⁸ R. Parks to W. Keeley, 4/13/1945, PPGNPR0000206-09, at PPGNPR0000206-07.

³⁹ Agreement between RFC and Mutual Chemical Company, 7/31/1945, PPGNPR0013299-310; and WPB Chemical Division, Progress Report for the week ended 8/18/1945, USNPR0005874-77. Also see WPB Chemicals Bureau, Inorganics Branch, Progress Report, for the week ending 3/31/1945, USNPR0005763-65; and WPB, Chemicals Bureau, Progress Report for the week ending 3/31/1945, PPGNPR0004299-302; WPB, Chemicals Bureau, Progress Report for the week ending 4/28/1945, PPGNPR0003289-90; WPB, Chemicals Bureau, Progress Report for the week ending 6/16/1945, PPGNPR0003252-53; and W. Whitman to Executive Committee, Chemicals Bureau, 6/21/1945, PPGNPR0027785.

Russian ore.⁴⁰ Records of NPRC's purchases from the MRC do not show any purchases of any Russian ore (see Appendix 1). In addition to the lack of any contracts between MRC and NPRC for Russian ore, NPRC correspondences fail to mention such purchases. An August 30, 1944 letter from NPRC to MRC, that was in response to a WPB letter from late July 1944 included,

a schedule of proposed Chrome Ore supply for the second half of the present year and also for the year 1945.⁴¹

Stanton of NPRC wrote,

[t]his schedule shows a total of 7000 tons of Transvaal Chrome Ore for our account for the second half of this year.⁴²

Strauss of the MRC responded to Stanton about a week later and his letter made no mention of Russian Ore.⁴³ Lacking any contracts or references in correspondences discussing NPRC's ore supply, it is illogical and contrary to sound historical method to assume that meeting an ore consumption quota warrants the conclusion that any of that ore was obtained from Russia.

Zoch Statement 34, pages 35-36: "In the face of this significant evidence that the proposed cream skimming subsidy arrangement was implemented at the NPR plant during World War II, the witness designated as the United States' representative in this matter acknowledged that there is no documentary evidence to the contrary."

My Rule 30(b)(6) deposition testimony also does not support Mr. Zoch's statement. Inserted below is the portion of the transcript that Mr. Zoch referenced.⁴⁴

12 Q. When you say it never went
13 through, were there any documents in the
14 documents we produced or the Government produced
15 that said we're not going to do this or it's not
16 going to happen?

⁴⁰ E. Perkins to S. Strauss, 7/3/1944, PPGNPR0010471. Also see S. Strauss to Mutual Chemical, 10/6/1944, PPGNPR0010508; S. Strauss to Mutual Chemical, 9/13/1944, PPGNPR0010522; S. Strauss to Mutual Chemical, 8/2/1944, PPGNPR0010532; and Brigham Report, 55-56.

⁴¹ S. Stanton to S. Strauss, 8/30/1944, PPGNPR0015836.

⁴² S. Stanton to S. Strauss, 8/30/1944, PPGNPR0015836.

⁴³ S. Strauss to S. Stanton, 9/7/1944, PPGNPR0015832. Also see S. Stanton to O. Rove, 9/6/1944, PPGNPR0015830-31.

⁴⁴ Deposition of Jay Lawrence Brigham, Ph.D., 6/27/2016, In The United States District Court, District of New Jersey, PPG Industries, Inc. v. United States of America et al., 164-65.

17 A. I believe there are no documents
18 that say this did not occur.
19 Q. It will not occur?
20 A. It did not occur.
21 Q. It did not occur.
22 And at some point you could tell
Page 165 ~
1 me where that document is?
2 A. At some point. Probably not today
3 or this week.
4 Q. So in regard to that proposed
5 subsidy to Natural Products Refining, you're
6 saying there's a document that says we're not
7 going to do this or there is no document
8 confirming that the recommendation was
9 implemented?
10 MR. BARB: Objection. Vague and
11 ambiguous.
12 THE WITNESS: I don't recall
13 seeing documents that the program moved forward.
14 BY MR. LAGROTTERIA:
15 Q. Okay. But you also don't recall
16 seeing a document that says we're not doing
17 this?
18 A. I believe that's correct.

As I testified in June, I have not seen documentation specifically saying that Natural Products did not participate in the subsidy program. However, the financial records of the subsidy program strongly indicate that Natural Products did not participate in the program as does the fact that no contract for a Natural Products purchase of higher-grade ore has been found. As late as June 8, 1944, Natural Products told the DSC that the company had no high-grade ore on hand and was not planning on purchasing any such ore. That documentation of Mutual Chemical's participation in the subsidy program exists suggests that if Natural Products had also participated, documentation of that participation would still exist as well.⁴⁵

As noted earlier, moreover, the absence of documents here does not tend to show that such documents ever existed. For example, no such documents are referenced in the documents that survive. Mr. Zoch's attempt to argue that the subsidy program *was* implemented at the Natural Products plant during World War II simply because neither party can find any *explicit* documentary evidence that it was *not* is speculation, and is contrary to sound historical methods and logic. (Emphasis added.)

Zoch Statement 35, pages 36-37: "[T]he government exerted significant control over the primary chromium chemicals industry throughout much of the Relevant Time Period, but especially during the World Wars. The imposition of these controls is illustrated in several

⁴⁵ Brigham Report, 55-56.

lectures delivered by Mr. Bernard Baruch during the 1920s, in which he described actions of the War Industries Board ('WIB') that he headed during World War I. The WIB was identified at that time as having more power than any other such entity created in the history of the world.”⁴⁶

This statement is vague and contrary to available historical evidence and opinions of established historians. The phrase “exerted significant control” is vague and ambiguous, as is his phrase “much of the Relevant Time Period.”⁴⁷ Mr. Zoch cites no evidence showing that the WIB had any direct contact with NPRC during World War I, that the Federal government’s regulation of the economy during World War I was anything like that needed during World War II, or that any such alleged controls existed during the twenty years between those wars. As I discussed in my expert report, and elsewhere in this rebuttal report, the Federal government’s actual and direct involvement with NPRC during World War II was minimal. There is no historical evidence suggesting that the Federal government had any contact with NPRC between World War I and World War II or from the end of World War II through PPG’s sale of the facility.

Zoch Statement 36, page 37: “One method utilized by the WIB to maintain control over those essential industries was to fix all prices of materials under the threat of commandeering non-compliant plants. Enforcement of this control was exercised under the powers authorized by the President, which included not only the threat of commandeering plants, but the actual exercise of that authority during World War I. In most cases, however, the mere threat of plant seizure was sufficient to ensure compliance.” Mr. Zoch also cites to a December 2, 1925 document on this page when discussing the WIB ability to take over plants. On the page Mr. Zoch cited, Mr. Baruch wrote,

I will tell you a very important thing in making prices; we depended on these being voluntary – at least we used every effort we could to get a voluntary agreement because if anybody had made a record and said, ‘I will accept this under duress,’ we would have an opportunity to come before the Court of Claims on that technicality and have a re-hearing. We have had time and time again a suit brought by men about these prices, and the court has never failed to throw them out on the ground that the price was voluntary. If any of them had objected, we would have commandeered them. Nobody ever seemed

⁴⁶ In fact, it was not Baruch who said that the WIB “had more power, probably, than any other board that has ever been created in the history of world.” A General Ely made that comment in his introduction of Baruch, see, B. Baruch, War Industries Board, Lecture delivered at the Army War College, Washington Barracks, D.C., 1/15/1925, PPGNPR0013417-49, at PPGNPR0013419.

⁴⁷ See response to Zoch Statement 35.

to have thought of the idea of making a record that under duress he had been forced to do this, but if they had, it would have been a very serious question.⁴⁸

There is no historical documentation suggesting that an agency of the Federal government ever contemplated seizing NPRC's plant during World War I, or that any "threat" of seizure affected what NPRC did. Nor am I aware of any evidence that the Federal government commandeered or threatened to commandeer a plant because a company objected to the price offered by the government for its goods.

Mr. Zoch's statements are also contrary to opinions of established historians who emphasize the cooperative nature of the industry in the World War I economy.⁴⁹ Although Baruch said, "we would have commandeered them," as he also points out there never was a need to take such action. And, such action would not have been simple, as Baruch suggested. The National Defense Act of 1916 contained a provision for the Federal government to seize a plant, but a seizure could only occur if war had been declared or was imminent, and the Government had issued a specific obligatory order which the company had refused. Moreover, only the President could direct a plant seizure through an executive order. These procedures would have taken time. Given that the United States did not declare war until April 1917 and the war ended twenty months later in November 1918, there was only a twenty-month period for the Government to have seized a plant under the terms of the Defense Act of 1916.⁵⁰

Zoch Statement 37, page 37: "Similar controls over industry were created at the beginning of World War II under the Office of Production Management and its successor the War Production Board, and by the Reconstruction Finance Corporation through its subsidiaries the Metals Reserve Company, the Foreign Economic Administration and the U.S. Commerce Company."

This statement is vague and ambiguous in that Mr. Zoch does not give any examples of such controls being exerted over NPRC operations, nor does he explain what he means by "similar." Mr. Zoch's reference to the government's seizure of the Diamond Chemicals plant in Painesville, OH in June 1945 fails to include the fact that the seizure was in response to a strike at the plant that interrupted production.⁵¹

⁴⁸ B. Baruch, "The War Industries Board," 12/2/1925, PPGNPR0014469-88, at PPGNPR0014473. The pages of this document are out of order. The title page is bates numbered PPGNPR0014486.

⁴⁹ See for example, Koistinen, *Mobilizing For Modern War*, 3-5, 198, 266-67.

⁵⁰ 39 Stat. 166, 6/3/1916, at 213.

⁵¹ Brigham Report, 34-37.

Zoch Statement 38, page 38: “The Industry Advisory Committee formed in September of 1942 . . . subsequent meetings were managed and primarily utilized by elements of the War Production Board and the military to maximize sodium bichromate production.”

This statement is contrary to historical documentation and opinions of established historians. The members of the Industry Advisory Committees, including the chromium chemicals committee, were the manufacturers themselves. They provided information to Federal agencies on a number of issues, including the federal regulations applicable to them, as well as their needs, plant capacities, and outputs.⁵²

A 1942 WPB memorandum from the Director of the Division of Industry Advisory Committees to the members of such committees stated that there were then some 400 such committees and that many of them met every month. They were “formed at the request of the chief of the industry branch involved to obtain the advice and cooperation of industry in connection with the War Program.”⁵³ These meetings were given legal protection from antitrust law prosecution provided that they confined themselves to collecting information and making recommendations, and avoided trying to make policy for an industry or reach any agreement or understanding among themselves regarding action to be taken by the industry. It stated that the Board “need[ed] the help and criticism of committees,” but that they should note that the committees were advisory only with all decisions made by the Government.⁵⁴

⁵² Brigham Report, 45-49. Koistinen wrote of Industrial Advisory Committees, “[i]ndustry’s grip on WPB was strengthened by the vastly expanded use industry advisory committee” whose number increased from thirty-three at the beginning of 1942 to 465 by the end of the year. By January 1944, 750 such committees existed, Koistinen, *Arsenal of World War II, The Political Economy of American Warfare, 1940-1945*, 200-201. Regarding the overall relationship of government to business during the war, Historian David Kennedy—who won the 2000 Pulitzer Prize for his work *Freedom From Fear* that examined the history of the United States during the Great Depression and World War II—wrote of wartime government programs to increase defense production, “[w]hen tax-advantaged private capital was not forthcoming, the Reconstruction Finance Corporation stood ready to provide government loans for needed plant expansion. As a further emolument, Roosevelt ordered the Justice Department to relax antitrust prosecutions. In perhaps the sweetest deal of all, military procurement agencies let contracts on a cost-plus basis, providing iron-clad guarantees of profits beyond the most avaricious monopolist’s dreams,” D. Kennedy, *Freedom From Fear, The American People in Depression and War, 1929-1945* (New York, Oxford: 1999), 623.

Mr. Zoch cites to a document titled “Chrome Chemicals,” dated September 1945 with bates number PPG US 0340. Counsel for PPG provided a copy of this document to the Department of Justice on 11/14/2016. However, the copy is illegible. Additionally, the bates number format is not one used in the current litigation.

⁵³ T. Shore to Members of Industry Advisory Committees, n.d., USNPR0006099-100.

⁵⁴ T. Shore to Members of Industry Advisory Committees, n.d., USNPR0006099-100.

Zoch Statement 39, page 38: “Primary chromium chemicals played a critical role in producing a wide range of military components through at least a dozen downstream industries.”

See my response to Zoch Statement 1.

Zoch Statement 40, page 39: “Near the end of the war in Europe, substantial new requirements for chromium chemicals developed to support the jet propulsion program, for additional Navy ship coatings, a new machine gun barrel liner and plating program, and continuing increases in leather requirements. Additional requirements for specific chromium chemicals also developed to support a secret military project, code named the Manhattan District, which resulted in the development of the atomic bomb and brought the war with Japan to an end.”

Mr. Zoch’s apparent lack of historical knowledge and training leads to the confusion inherent in this set of statements. Mr. Zoch’s reference to “a secret military project, code named the ‘Manhattan District,’” lacks a citation to a primary document and is speculative in nature. The top secret work to make an atomic bomb was actually code named the “Manhattan Project” and the work was centered in, but not limited to, Los Alamos, NM, and Oak Ridge, TN. A document that Mr. Zoch cites to was from “Victor A. Sheridan, Captain, Corps of Engineers Assistant” to “Headquarters, Army Services Forces Production Division, Attention: Lt. Col T.C. Keeling Chemicals Section Room H-221, Tempo. Bldg ‘B’ Washington, DC.” Sheridan wrote the letter on June 16, 1945, exactly one month before the successful testing of the atomic bomb at Alamogordo, NM. The referenced document is not stamped “Top Secret” and, in fact, no classification stamps are found on the document, as one would expect if it was related to the development of such a weapon.⁵⁵ See also my response to Zoch Statement 1.

Zoch Statement 41, page 39: “Throughout the war, maintenance of the primary chromium chemicals plants was deferred by the necessity of operations far beyond prudent inspection and maintenance schedules. Available maintenance manpower and spare parts were utilized only for necessary repairs as a result of equipment failures in order to maximize production.”

This vague and general statement is not supported by historical documentation. Although maintenance often was deferred during World War II, Federal officials reported that the Imperial Paper chromium plant in Glens Falls, NY operated safely and did not have the severe labor

⁵⁵ V. Sheridan to T. Keeling, 7/16/1945, PPGNPR0027788.

problems during World War II that existed at the other chrome chemical companies.⁵⁶ Numerous historical documents tie together the issues of plant maintenance, labor shortages, and plant inspections.

In December 1943, for example, the United States Public Health Service (“USPHS”) released the report, “Evaluation of the Health Hazards Due to Chromium Compounds in the Chromium Ore Reducing Plants in the United States,” at the request of the WPB. In the “general conclusions,” the report stated that “[i]n general, the conditions found in the four plants are the worst ever encountered in an industry as a whole.”⁵⁷ Results of the tests made “in four of the six plants visited indicate[d] that, with the exception of the unroasted ore handling equipment at the Martin Dennis Company, the atmospheric contamination in every area investigated in all the plants is higher than the accepted maximum, due either to the operations in that area or to operations in adjacent areas. . . . The general housekeeping in all the plants is not adequate to maintain the plants in good order. That in the two Mutual Chemical Company plants appears to be nonexistent.” The authors continued “[a]ll of the plant managers realize the conditions within their respective plants. The conditions observed, according to them, are due to manpower shortage . . . and to the necessity for keeping equipment in operation far beyond the normal inspection and repair period.”⁵⁸

The December 1943, USPHS document “Evaluation of the Health Hazards Due to Chromium Compounds in the Chromium Ore Reducing Plants in the United States,” concluded by stating that the “managements of the respective plants all recognize this condition and appear willing and anxious to make any corrections *which they consider practical*. The most general complaint heard was lack of competent manpower. Lack of equipment and repair supplies did not seem to be a major handicap. The conversations with the plant managers led to the following general conclusions as to their needs: [m]odification of roasting or leaching equipment . . . [c]rews of unskilled labor. . . to clean up the plants and put the structures in good condition . . . [and] Quite a large increase in semi-skilled and skilled labor on a permanent basis is needed to maintain the plants and the equipment, both from the standpoint of production and from the standpoint of safety and occupational disease hazards.”⁵⁹ (Emphasis added.)

⁵⁶ Brigham Report, 65-66.

⁵⁷ T. Thomas and H. Seifert, “Evaluation of the Health Hazards Due to Chromium Compounds in the Chromium Ore Reducing Plants in the United States,” (National Institute of Health, Division of Industrial Hygiene), 11/9/1943-12/10/1943, COMP0000658-72, at COMP0000670.

⁵⁸ T. Thomas and H. Seifert, “Evaluation of the Health Hazards Due to Chromium Compounds in the Chromium Ore Reducing Plants in the United States,” (National Institute of Health, Division of Industrial Hygiene), 11/9/1943-12/10/1943, COMP0000658-72, at COMP0000659.

⁵⁹ T. Thomas and H. Seifert, “Evaluation of the Health Hazards Due to Chromium Compounds in the Chromium Ore Reducing Plants in the United States,” (National Institute of Health, Division of Industrial Hygiene), 11/9/1943-12/10/1943, COMP0000658-72, at COMP0000670-71.

A November 8, 1944, WPB Chemicals Bureau memorandum described a recent survey of the chromate industry. The author noted that the plants were quite similar, that there was “considerable ill-feeling and mistrust among the various producers,” and that “there is a hopeless lack of and great need for good chemical engineering technology in the plants.”⁶⁰ He had surveyed Diamond, Imperial, Martin Dennis, NPRC, and Mutual in Jersey City and Baltimore. In his discussion of NPRC he reported that “[i]t was only after some insistence that we were permitted to see this plant. The company has apparently had some unfortunate experiences in the past with letting engineers in and so plant inspections were against their policy.”⁶¹ (Emphasis added.) He also said that “[T]he labor situation in this plant appeared to be excellent. Housekeeping and plant lay-out were fairly good for a chromate plant. The equipment was old but of good mechanical design. Maintenance appeared to be well organized and morale among the workers seemed to be good. The company indicated they could solve their own problems if left alone by the government.”⁶²

Documents from the last year of the war continued to address these same issues. They show that within the plants, company executives remained responsible for the allocation and duties of the laborers available to them. The WPB transcript of the January 2, 1945 meeting of the Chemicals Bureau Requirements Committee included a discussion regarding the shortage of labor at the chromium chemical plants generally,

The furnaces or kilns are operated continuously and on a seven-day week basis, except for shutdowns. However, we have had a number of shutdowns that are completely unscheduled, which stem from pure maintenance problems and the primary cause is that maintenance men are being diverted to operating jobs and maintenance is allowed to slide.⁶³

Obtaining between 120 and 150 new men for all of the plants comprised of “largely unskilled labor,” would help increase production.⁶⁴

⁶⁰ J. Hedrick to J. Wizeman, 11/8/1944, USNPR0000472-75, at USNPR0000472.

⁶¹ J. Hedrick to J. Wizeman, 11/8/1944, USNPR0000472-75, at USNPR0000474.

⁶² J. Hedrick to J. Wizeman, 11/8/1944, USNPR0000472-75, at USNPR0000474.

⁶³ WPB, Verbatim Transcript, Chemicals Bureau Requirements Committee, 1/2/1945, PPGNPR0008863-90, at PPGNPR0008874.

⁶⁴ WPB, Verbatim Transcript, Chemicals Bureau Requirements Committee, 1/2/1945, PPGNPR0008863-90, at PPGNPR0008874-75.

The WPB Chemicals Division “Progress Report” for the week ended June 2, 1945 also stated that Diamond Alkali had proposed that WPB request furloughs from the Army for ten of its former employees as a way to increase production of chromium chemicals. The chief of the WPB chromium chemical unit doubted that such furloughs would be possible. The report also stated that Imperial was having a scheduled maintenance shutdown from June 13 to June 18, 1945, and that the “production loss will be offset by shipments from National Products Refining Company.”⁶⁵

The WPB Chemicals Bureau, Inorganics Branch Progress Report for the week ending June 2, 1945 stated that Imperial will have a scheduled maintenance shut-down from June 3 to June 18 and the production loss will be offset by shipments from NPREC. “Any further postponement of this maintenance work would probably have caused excessive production losses.”⁶⁶

In July 1945, the WPB Chemicals Division “Progress Report” for the week ended July 21, 1945 stated that NPREC had resumed production “after a one week vacation and maintenance shutdown.”⁶⁷

The WPB History - Chrome Chemicals released shortly after the end of the war stated generally that “[m]aintenance of chrome plants was allowed to slide in the early part of the war as a means of obtaining increased output.”⁶⁸ As manpower shortages became apparent maintenance labor was even shorter than operating labor and it soon became impossible to conduct regularly scheduled maintenance in all plants. “All available maintenance facilities were used for repair of spot breakdowns which were very frequent and seriously interfered with maximum production. There is no doubt that properly scheduled maintenance would have resulted in increased output.”⁶⁹

Zoch Statement 42, page 39: “In summary, military demands for sodium bichromate during World War II resulted in government direction to increase production at all cost to satisfy requirements that continued to escalate during the war as new and expanded uses developed.”

⁶⁵ J. Wizeman to W. Whitman, WPB, Inorganics Branch, Industry Advisory Committee, Progress Report, 6/2/1945, PPGNPR0000011-18, at PPGNPR0000017.

⁶⁶ J. Wizeman to W. Whitman, WPB, Inorganics Branch, Industry Advisory Committee, Progress Report, 6/2/1945, USNPR0005788-89.

⁶⁷ J. Wizeman to W. Whitman, WPB, Inorganics Branch, Industry Advisory Committee, Progress Report, 7/21/1945, USNPR0005865-67.

⁶⁸ W. Healey, “History Chrome Chemicals,” 9/7/1945, PPGNPR0008669-94, at PPGNPR0008675.

⁶⁹ W. Healey, “History Chrome Chemicals,” 9/7/1945, PPGNPR0008669-94, at PPGNPR0008676.

This statement is ambiguous in that the phrase “at all costs” is not defined or explained, nor is any detail or quantification provided as to any “escalat[ing]” requirements. The statement is also baseless in that no government “direction to increase production” has been found.⁷⁰

Zoch Statement 43, page 40: “Despite the industry’s request for cost relief, including that from NPR, the Office of Price Administration remained firm in its control of chromite ore and sodium bichromate pricing at mid-1941 levels throughout the war.”

This statement is contrary to available historical evidence. In February 1945, the OPA raised the price of primary chrome chemicals when it issued Maximum Price Regulation 575.⁷¹ There are also numerous documents showing that the chemical chrome industry did not readily respond to the OPA’s request for information. For example, NPRC did not provide financial data for 1942 to the OPA until June 2, 1944. NPRC provided its 1943 financial information to the OPA on May 23, 1944. The company provided 1944 financial information to the OPA on April 4, 1945.⁷²

In April 1943, two OPA staff members reported on their thwarted attempts to obtain cost and price information from NPRC, after being passed back and forth between company executives and its outside accountant over the course of a month. Their efforts started on March 9, 1943 when they contacted the NPRC office. A company official told the OPA officials to contact the company’s accountant sometime after March 15, which they did on March 23rd and 26th. After making and appearing for their April 2 appointment with the accountant, however, they were told that they could not start their work “before April 15th and perhaps later as . . . the President of the company who was in Florida,” and the accountant needed to “obtain permission from him to supply us with the records.” Stymied in their attempts to obtain the requested financial information, the two men returned to Washington on April 12th.⁷³

Zoch Statement 44, page 40: “As Mr. Baruch observed immediately after he took charge of the WIB during World War I, the most important element of war-time price fixing was control of the labor cost component of manufacturing. As an element of that control, in April 1918,

⁷⁰ Brigham Report, 52-57.

⁷¹ Brigham Report, 60.

⁷² OPA, Form A—Annual Financial Report, For Fiscal Year ended 12/31/1942, 6/2/1942, USNPR0001260-77; OPA, Form A—Annual Financial Report, For Fiscal Year ended 12/31/1943, 5/23/1924, USNPR0001278-96; and OPA, Form A—Annual Financial Report, Report For Fiscal Year Ended 12/31/1944, 4/4/1945, USNPR0001297-300.

⁷³ W. Lantz and J. Deutschmeister to J. Coppock, 4/21/1943, PPGNPR0560375-76.

President Wilson established the National War Labor Board ('NWLB') to prevent war-time labor disputes from disrupting military production. The NWLB heard 1,245 cases during that war, with the Smith and Wesson Company small arms manufacturing plant case resulting in one of the four seizures that occurred during World War I.”

This statement is irrelevant in that there is no historical evidence to suggest that the Federal government ever contemplated a seizure of NPRC’s plant during World War I. Also see my response to Mr. Zoch’s Statement 36.

When the government seized a plant during World War I it did so to prevent labor unrest from impeding or stopping production. In a question and answer exchange with Charles Foster, former Vice Chairman of the WIB Priorities Committee, an Army colonel noted, “I think the Army had one case of commandeering, and it was done more for the protection of the company than from the Government’s standpoint.”⁷⁴

This seizure of the Smith and Wesson plant in Springfield, MA was a result of labor unrest. Workers left their jobs after the company fired members of a workers’ committee who sought higher wages. It was later noted that when the government seized the plant, “[t]he company acquiesced in and virtually invited such action and the employees, upon seizure, promptly returned to work.”⁷⁵

Zoch Statement 45, page 40: “While the threat of seizure during World War II typically brought industrial plants into conformance with government directives, the labor unions were not so easily coerced.”

Mr. Zoch speculates here that the Federal government issued any directives to NPRC, that the government ever threatened NPRC with seizure, and that any “threat of seizure” against labor unions actually coerced or brought about NPRC’s compliance with any such directive. Mr. Zoch also offers no basis for his assumption as to why any other companies “typically” complied with the laws and regulations of the time.

Also, what Mr. Zoch does not discuss is that fifty-seven of the sixty-four World War II seizures (eighty-nine percent) were because of strikes or labor unrest meaning that the intervention of the Federal government served to keep production going to the benefit of the war

⁷⁴ Conference with Mr. Charles K. Foster, former Vice-Chairman, Priorities Committee, War Industries Board, War Resources Board., n.d. COMP0000518-30, at COMP0000520.

⁷⁵ R. Ohly, *Industrialist in Olive Drab* (Washington, DC: Center for Military History, 1999), 10-11, USNPR0000983-1112, at USNPR0001005-06.

effort; not to mention maintain the revenues of the business owners and managers.⁷⁶ This is precisely what happened at the Diamond Alkali plant in Painesville, OH in June 1945. The paragraph from the WPB document that Mr. Zoch cites reads,

Some progress had been made in attempts to fully staff the Painesville, Ohio plant of the Diamond Alkali Company with the objective of obtaining output at capacity levels. All efforts in this direction were frustrated by the complete shutdown of operations because of a strike of workers at the company's bichromate and alkali plants. After a cessation of operations for four days, the Army took over the plant at 2:00 P.M., June 19, 1945. The full effect of the loss in output cannot be ascertained at present because it is anticipated that weeks will elapse before normal conditions prevail throughout the works.⁷⁷

Zoch Statement 46, page 40: “The primary labor problems experienced by the chromium chemicals industry arose due to the health hazards presented by chrome dust, especially during summertime conditions around the roasting process, along with pervasive substandard wages within the industry.”

This statement is irrelevant in that it does not address who had the duty and responsibility to ameliorate or address health hazards of chromium chemical production to the companies' workers. Mr. Zoch also fails to acknowledge that poor working conditions and “substandard wages” also existed both before and after World War II. As I discussed in my expert witness report, a WPB representative stated that workers in chrome chemical plants received lower pay than workers in other less hazardous jobs.⁷⁸ As I also discussed in my expert witness report, in the 1950s two studies were made of working conditions at NPRC.⁷⁹ The company chose to keep the results of those two studies secret. In the late 1950s continuing into the 1960s numerous claims were made by NPRC workers for compensation for injuries and illnesses they had suffered (for examples see Appendix 2). These and other portions of my October 7, 2016 report show risks and injuries existing before and well after World War II.⁸⁰ In 1992, Jack Kaplan—who worked as a chemist at the plant from the summer of 1961 to the summer of 1962—testified that within a month of starting work at the plant, he was instructed to coat his nostrils with Vaseline to prevent

⁷⁶ R. Ohly, *Industrialist in Olive Drab*, Appendix C, “Schedule Showing Number of Seizures by Year, by Agency, and by Type,” USNPR0000983-1112, at USNPR0001072.

⁷⁷ D. Morgan to R. Williams, “Critical Products Report – BIOCHROMATE,” 6/21/1945, USNPR0017436-37.

⁷⁸ Brigham Report, 67.

⁷⁹ Brigham Report, 81-85 and 91-99.

⁸⁰ Brigham Report, 66-69, 81-85, and 91-99.

septum perforations.⁸¹ As noted in my response to Statement 41 the Glens Falls facility operated much more cleanly than the other chromium plants, and had no trouble finding laborers to work there.⁸²

Zoch Statement 47, page 40: “When the NPR Employee’s Association applied for approval of wage or salary rate adjustments, the request was denied by the WLB.”

The cited document does not discuss the NPRC Employee’s Association or a request for salary adjustment, or a WLB decision regarding it.⁸³ Nor does Mr. Zoch cite any documents relating to any of the policies or bases for any decisions of the WLB.

Zoch Statement 48, pages 40-41: The “WPB established an interagency task force to intervene in the manpower and labor issues facing the industry. Representatives of the Army, Navy, Air Corps, War Manpower Commission, and both Operations and Labor Divisions of the WPB participated on this task force to develop a plan of action to resolve labor difficulties facing chromium chemicals producers.”

This set of statements is vague and ambiguous as to whether any WPB “interagency task force” actually “intervene[d]” in the manpower and labor issues facing the industry, and specifically what the nature of the alleged intervention was. Likewise, Mr. Zoch fails to offer anything to explain what the “plan of action to resolve labor difficulties” actually was, whether it was ever implemented, and—in particular—whether it was ever used with respect to Natural Products.

Zoch Statement 49, page 41: “Essentially all of the military and civilian war agencies were involved in some way with chromite chemicals plant labor issues.”

The document citation that precedes this quote discussed the task force comprised only of representatives from the Army, Navy, Army Air Force, the War Manpower Commission, and the WPB.⁸⁴ It also seems implausible at best that “essentially” all of the dozens of military and Federal civilian war agencies were included in the discussion of labor problems at chrome chemical plants, and Mr. Zoch offers no basis for this claim.

⁸¹ Deposition of J. Kaplan, Exxon v PPG, 3/4/1992, PPGNPR00691170-279; at PPGNPR0069182, PPGNPR0069195, and PPGNPR0069202.

⁸² Brigham Report, 65-66.

⁸³ L. Sherman to C. May, 8/26/1944, PPGNPR0014998-99.

⁸⁴ L. Sherman to C. May, 8/26/1944, PPGNPR0014998-99.

Zoch Statement 50, page 41: “[E]arly in 1944. . . NPR was operating on a six day work week because it could not afford the Sunday double-time labor rates for continuous operation, and the NPR direct labor cost had already risen over 25% from that in March 1942. Nevertheless, the Army Service Forces requested that the Production Division of the WPB make further efforts to insist on a 7-day operation of the NPR plant.”

The cited document does not support this statement. The document reads, in part,

It is requested that further effort be made to provide additional labor to the chromium chemicals producers, particularly in the New Jersey area. It is suggested that an effort be made to provide 7-day operation at the Natural Products plant. It is requested that this office be informed of the progress made.⁸⁵

There is nothing in the document to suggest that the WPB actually “insisted” on a seven-day work week, or actually made any “further efforts” to do so, or that Natural Products ever did so during World War II.

In addition, Mr. Zoch uncritically relies solely on the self-serving statement of NPRC’s president referenced in an Army memorandum: “Mr. Goman stated that his plant has been operating only six days a week because they can not afford to pay double time labor for Sunday operation and still operate within the OPA price ceilings.”⁸⁶

Zoch Statement 51, page 41: “The U.S. military and civilian war organizations knew that the generation of waste sludge was inherent in the primary chromium chemicals manufacturing process, and that those production sludges were discarded at the plants.”

This statement is contrary to available historical evidence and opinions of established historians, and is out of proper historical context. There is nothing to suggest that Natural Products, or the other four companies involved in chromium chemical production, were not following standard industrial practices of the time. Concerns within the chromium chemical industry during World War II (Imperial’s Glens Falls plant notwithstanding) involved industrial hygiene and worker health and safety, and those concerns continued into the late 1950s and early 1960s.⁸⁷ Concern over long-term and persistent environmental problems caused by industrial practices remained a thing of the future. The environmental awareness awakened in part by

⁸⁵ J. Cooke, Materials Branch, Production Division, ASF, 3/17/1944, PPGNPR0022779.

⁸⁶ Memorandum for the Chief, Materials Branch, Production Division, Headquarters, Army Service Forces, Subject: Chromium Chemicals – Report of Trip, 2/18/1944, PPGNPR0027802-04, at PPGNPR0027803.

⁸⁷ Brigham Report, 66-69, 81-85, and 91-99. Also see Appendix 2 for additional documents regarding worker safety and insurance claims.

Rachel Carson's seminal work *Silent Spring* was more than a decade off and it was twenty-five years after the end of World War II that the Environmental Protection Agency was established.⁸⁸

Mr. Zoch also tries to blur the real difference between being aware of something and being responsible for changing it. The available evidence does not include anything to show that anyone from a federal agency had any duties or responsibilities relating to the generation or handling of wastes at the Natural Products plant or the disposal of those wastes there.

Zoch Statement 52, page 41: "During site visits by representatives of those agencies, the presence and magnitude of the waste piles could not have been overlooked as evidenced by the oblique photographs obtained by Aero Data."

See response to Zoch Statement 51. This statement also lacks a citation to any primary or secondary source document and is speculative in nature as Mr. Zoch offers no evidence that any "representatives of those agencies" who actually visited Natural Products' Jersey City plant were provided any information regarding Natural Products' generation or handling of wastes, or the magnitude of the company's waste piles. Except for the known visits by a federal employee of the WPB and possibly the OPA at the plant, as I discussed in my response to Zoch Statement 29, no valid assumption can be made other than that the employee may have seen Natural Products waste piles behind the plant in the course of his focus on other matters.

Zoch Statement 53, pages 41-42: "Additionally, it was evident to them that any increase in sludge production through the wasteful use of chromite ore generated as a result of eliminating sludge reworking would be stored outdoors."

See my responses to Zoch Statements 27- 29 and 51. There is also no known documentary basis for Mr. Zoch's assumptions and speculation that Natural Products eliminated its reworking of chemical manufacturing process sludge, or that anything relating to an increase in or storage of sludge was "evident" to any federal agency employee who visited the Garfield Avenue plant.

Zoch Statement 54, page 42: "Therefore, when NPR expanded production during 1944 through the reduction or elimination of sludge reworking, the predictable result was that additional sludges containing higher levels of residual chromium would be stockpiled at its plant site."

See my responses to Zoch Statements 27- 29, 51, and 53.

⁸⁸ R. Carson, *Silent Spring* (1962; repr., Boston: Houghton Mifflin, 1987).

Zoch Statement 55 page 42: “The U.S. took no action to prevent this increased waste stockpiling or to offer alternatives, and directed and/or guided actions that resulted in that waste disposal practice.”

See my responses to Zoch Statements 27- 29, 51, 53, and 56.

Zoch Statement 56, page 42: “The United States:”

- placed operational and financial controls on the primary chromium chemicals industry under the serious threat of plant seizure. . .

There is no evidence to suggest that the Federal government placed controls on the day-to-day operations and operating decisions within NPRC’s Jersey City plant. There is no evidence that the Federal government ever even considered, let alone threatened, seizing NPRC’s Jersey City plant. Mr. Zoch’s vague reference to “financial” controls is accurate only to the extent that the Federal government regulated the price of raw materials used at the plant and of the chromium chemicals it made during World War II, along with the prices of thousands of commodities throughout the economy to minimize inflation and prevent profiteering.⁸⁹

- [F]roze product prices at levels in effect before the U.S. entered World War II, and increased the cost of chromite ore feedstock that could only be obtained from the government stockpile.

See my response to Zoch Statement 43. Although the MRC sold ore to manufacturers of chrome chemicals beginning in mid-1943, those sales in fact benefited the industry by ensuring an adequate ore supply without requiring that the companies carry substantial raw material inventories.

- [M]andated the maximum possible production of primary chromium chemicals despite adverse health impacts on the workforce and the deferral of necessary maintenance.”

Although the government desired increased production from the chromium chemical industry, Mr. Zoch cites no evidence to suggest that the government directed it by discouraging or prohibiting industry improvements to worker health, that the government ever took that responsibility away from the companies in whole or part, or that the government issued

⁸⁹ World War II was not the only time the government issued price controls. In 1971, President Nixon in response to inflationary pressures caused by rising oil prices and the Vietnam War froze wages, prices, and rents for ninety days, P. Boyer, et al., *The Enduring Vision, A History of the American People*, vol. 2 (Lexington, MA: D.C. Heath and Company, 1996), 1013-15.

“mandate[s]” to maximize production “despite” adverse worker health effects or deferred maintenance. I have found no such evidence either. To the contrary, Government officials were aware that Imperial Paper operated its plant in Glens Falls, NY with fewer hazards to workers and thus did not suffer chronic labor shortages. Moreover, Government personnel always considered such matters to be those for which company executives were responsible.⁹⁰

- [C]ontrolled wages and intervened in labor actions concerning the NPR plant.

See my response to Zoch Statement 37. There is no historical evidence to suggest that the Federal government intervened in “labor actions” at NPRC’s plant in Jersey City, nor does Mr. Zoch explain what he means by “labor actions” or his allegation of “interven[tion].”

- directed and/or guided actions at the NPR plant which resulted in the on-Site disposal of process sludges which contained and released hazardous substances.

There is no historical evidence to suggest that the Federal government “directed and/or guided” operations at the NPRC plant in Jersey City. Mr. Zoch fails to explain what he means by, or provide any factual basis for, his claim that the Federal government “directed and/or guided actions which resulted in the” disposal of hazardous substances, including wastes.

Zoch Statement 57, page 42: “In consideration of relevant CERCLA practice, this pervasive control of NPR plant operations meets criteria for liability of the United States under the statute as an operator (in addition to NPR).”

This is a legal opinion that is beyond the nature and scope of a historian’s training and expertise. The ambiguous use of the word “pervasive” is a conclusion which Mr. Zoch fails to support with the kind of evidence accepted by historians.

Zoch Statement 58, page 36: “the evidence is sufficient to demonstrate that the NPR process modifications proposed by the WPB did, in fact, occur through contract, agreement or otherwise, and that the U.S. is therefore liable as a CERCLA arranger for Site contamination.”

This is a legal opinion that is beyond the nature and scope of a historian’s training and expertise. It is also contrary to the available evidence, and is based instead solely on unfounded assumptions. See my responses to Zoch Statements 27-29, 51, and 54-57.

⁹⁰ Brigham Report, 65-68.

III. Rebuttal of Mr. David Toner⁹¹

Mr. Zoch relied on the opinions of Mr. Toner for purposes of Mr. Zoch's proposed cleanup cost allocation. From a historical perspective, I question Mr. Toner's ability to understand this case and offer such opinions, particularly given his review of only five documents selected for him by PPG counsel.

Mr. Toner also omits significant provisions from his description of one of the few documents that he reviewed - NPRC's July 8, 1954 Plan of Reorganization.⁹² This Plan of Reorganization provided that as of the date of closing of the reorganization plan, Frances Ferguson (formerly Goman) would be the sole stockholder of Natural Products, and that PPG would issue and "deliver shares of its fully paid, non-assessable common stock . . . to Natural as follows: 26,201 shares of said stock plus that number of shares which at the average market price on the New York Stock Exchange for said stock as of July 1, 1954, to wit, \$57.25 per share."⁹³ The language of the plan of reorganization further stated, "[t]his plan of reorganization contemplates the complete liquidation of Natural in which there will be affected as between Ferguson and Natural an exchange of stock by which Ferguson will transfer to Natural all of her stock in Natural in exchange for all of the stock of Pittsburgh received by Natural pursuant to this plan of reorganization."⁹⁴

Mr. Toner also fails to note that a July 26, 1982 letter to PPG Industries from the Delaware Department of State advised that NPRC had filed a certificate of dissolution on September 14, 1954, at which time it ceased to be a business entity.⁹⁵ There is also deposition testimony showing continuity of ownership between NPRC and PPG. Susan Kuis testified in 1989, that in the early 1980s after passage of CERCLA, PPG undertook studies of "old plant sites" including the site in at Garfield Avenue in Jersey City without distinguishing between NPRC and PPG operations.⁹⁶

⁹¹ Expert Report of David Toner, 10/7/2016, PPG Industries, Inc., v. United States of America, et al., United States District Court for the District of New Jersey, CA No. 2:12-cv-0352 (JMV)(MAH) ("Toner Report").

⁹² Toner Report, 3.

⁹³ Plan of Reorganization, 7/8/1954, PPGNPR0659913-23, at PPGNPR0659914-15.

⁹⁴ Plan of Reorganization, 7/8/1954, PPGNPR0659913-23, at PPGNPR0659923. Also see Brigham Report, 85-87.

⁹⁵ M. Shultie to P. King, 7/26/1982, PPGNPR0709006.

⁹⁶ Deposition of S. Kuis, PPG Industries v. Evanston Insurance Company, et al., 1/30/1989, PPGNPR0840345-459, at PPGNPR0840355-56.

Appendix 1

NPRC's Ore Purchases from the MRC⁹⁷

Contract #	Date	Material	Quantity (dry basis)	Bates Number
MR C-1 S-542 (chrome)	06/08/43	Transvaal Grade B chrome ore	7,000 long tons	USNPR0000048
MR C-1R S-694 (chrome)	10/02/43	Transvaal Grade B chrome ore	1,000 long tons	USNPR0000047
MR C-1 S-834 (chrome)	12/08/43	Transvaal Grade B chrome ore	1,000 long tons	USNPR0000046
MR C-1 S-1178 (chrome)	06/13/44	South African Transvaal chrome ore	2,000 long tons	USNPR0000042
MR C-1 S-996 (chrome)	04/18/44	South African Transvaal chrome ore	2,071 long tons	USNPR0000043
MR C-1R S- 1178 (chrome)	08/03/44	South African Transvaal chrome ore	2,000 long tons	USNPR0000041
MR C-1 S-1478 (chrome)	09/19/44	South African Transvaal chrome ore	2,000 long tons	USNPR0000040
MR C-1 S-1556 (chrome)	10/21/44	South African Transvaal chrome ore	2,600 long tons	USNPR0000038-39
MR C-1 S-1797 (chrome)	12/12/44	Transvaal Grade B chrome ore	1,500 long tons	USNPR0000037
MR C-1 S-2207 (chrome)	02/28/45	Transvaal Grade B chrome ore	3,600 long tons	USNPR0000036
MR C-1 S-2513 (chrome)	04/19/45	Transvaal Grade B chrome ore	4,000 long tons	USNPR0000034-35

⁹⁷ The contracts listed in this table beginning in 1944 also are listed in what appears to be an incomplete document listing purchases of South African ore and chrome from other sources bates numbered USNPR0001589-98. In this document contract MR C-1 S-1556 is for 4,200 long tons (USNPR0001590).

MR C-1 S-2799 (chrome)	06/21/45	Transvaal Grade B chrome ore	2,000 long tons	USNPR0000033
MR C-1 S-3163 (chrome)	10/19/45	Transvaal Grade B chrome ore	3,800 long tons	USNPR0000032
MR C-1 S-3293 (chrome)	01/03/46	Transvaal Grade B chrome ore	225 long tons	USNPR0000031
MR C-1 S-3371 (chrome)	02/15/46	Transvaal Grade B chrome ore	3,000 long tons	PPGNPR1121643
Total			37,796 long tons	

Appendix 2

Worker Safety and Insurance Claims

Standard Form for Surgeon's Report, American Motorist Insurance Co., 01/03/1956, PPGNPR0077133-34; State of New Jersey, Accident Blank, Form "C," Claim No. Illegible, New Jersey Manufacturers Casualty Insurance Company, 06/14/1943, PPGNPR0077135; State of New Jersey, Accident Blank, Form "C," Claim No. 53-L-87853, New Jersey Manufacturers Casualty Insurance Company, 12/30/1952, PPGNPR0077138; State of New Jersey, Accident Blank, Form "C," Claim No. 51-J-75375, New Jersey Manufacturers Casualty Insurance Company, 02/08/1951, PPGNPR0077139; State of New Jersey, Accident Blank, Form "C," Claim No. 51-J-97708, New Jersey Manufacturers Casualty Insurance Company, 07/21/1951, PPGNPR0077140; State of New Jersey, Accident Blank, Form "C," Claim No. 50-J-31919, New Jersey Manufacturers Casualty Insurance Company, 02/22/1950, PPGNPR0077141; State of New Jersey, Accident Blank, Form "C," Claim No. 53-L-89032, New Jersey Manufacturers Casualty Insurance Company, 01/24/1953, PPGNPR0077148;;; State of New Jersey, Accident Blank, Form "C," Claim No. blank, New Jersey Manufacturers Casualty Insurance Company, 05/29/1946, PPGNPR0077166; State of New Jersey, Accident Blank, Form "C," Claim No. illegible, New Jersey Manufacturers Casualty Insurance Company, 03/23/1951, PPGNPR0077167; State of New Jersey, Accident Blank, Form "C," Claim No. illegible, New Jersey Manufacturers Casualty Insurance Company, 12/16/1947, PPGNPR0077168; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-21, 01/27/1956, PPGNPR0077311-12; State of New Jersey, Accident Blank, Form "C," Claim No. blank, American Motorists Insurance Company, 01/27/1956, PPGNPR0077313; Standard Form for Surgeon's Report, American Motorist Insurance Co., 01/27/1956, PPGNPR0077314-15; State of New Jersey, Accident Blank, Form "C," Claim No. blank, American Motorists Insurance Company, 03/07/1956, PPGNPR0090623; Standard Form for Surgeon's Report, American Motorist Insurance Co., 03/07/1956, PPGNPR0090624-25; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 55-21, 03/05/1955, PPGNPR0090627-28; State of New Jersey, Accident Blank, Form "C," Claim No. blank, American Motorists Insurance Company, 03/05/1955, PPGNPR0090629; Standard Form for Surgeon's Report, American Motorist Insurance Co., 03/05/1955, PPGNPR0090630-31; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 55-86, 11/01/1955, PPGNPR0090633-34; State of New Jersey, Accident Blank, Form "C," Claim No. blank, American Motorists Insurance Company, 11/01/1955, PPGNPR0090635; Standard Form for Surgeon's Report, American Motorist Insurance Co., 11/2/1955, PPGNPR0090637-38; State of New Jersey, Accident Blank, Form "C," Claim No. illegible, New Jersey Manufacturers Casualty Insurance Company, 03/19/1952, PPGNPR0090641-42; State of New Jersey, Accident Blank, Form "C," Claim No. blank, New Jersey Manufacturers Casualty Insurance Company, 03/24/1943, PPGNPR0090644-45; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-58, 04/06/1956, PPGNPR0090708-09; State of New Jersey, Accident Blank, Form "C," Claim No. blank, American Motorists Insurance Company, 04/06/1956, PPGNPR0090710; Standard Form for Surgeon's Report, American Motorist Insurance Co., 04/10/1956, PPGNPR0090711-12; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-15, 01/20/1956, PPGNPR0090714-15; State of New Jersey, Accident Blank, Form "C," Claim No. blank, American Motorists Insurance Company, 01/20/1956, PPGNPR0090716; Standard Form for Surgeon's Report, American Motorist Insurance Co., 01/20/1956, PPGNPR0090717-18; Standard Form for Surgeon's Report, American Motorist Insurance Co., 01/24/1956, PPGNPR0090719-20; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 58-15, 02/14/1958, PPGNPR0090724-25; State of New Jersey, Accident Blank, Form "C," Claim No. blank, Kemper Insurance, 02/14/1958, PPGNPR0090726; Amdur, Louis M. to American Motorists Insurance Co., 04/21/1958, PPGNPR0090727-28; Columbia-Southern Chemical Corporation, Supervisor's Report of Accident Investigation, 04/16/1958, PPGNPR0090729-30; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-74, 04/20/1956, PPGNPR0090732-33; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-81, 04/13/1956, PPGNPR0090736-37; Pittsburgh Plate and Glass Company, Doctor and Lost Time Injury Report, Case No. 59-4, 08/00/1958, PPGNPR0090740-41; Pittsburgh Plate and Glass Company, Doctor and Lost Time Injury Report, Case

No. 57-32, 06/14/1956, PPGNPR0090745-46; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-24, 02/02/1956, PPGNPR0090755-56; Standard Form for Surgeon's Report, American Motorist Insurance Co., 02/06/1956, PPGNPR0090758-59; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case 57-36, 01/01/1957, PPGNPR0090768-69; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 60-42, 12/03/1959, PPGNPR0090772-73; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 55-8, 02/03/1955, PPGNPR0090786-87; State of New Jersey, Accident Blank, Form "C," Claim No. blank, American Motorists Insurance Company, 02/03/1955, PPGNPR0090788-89; Standard Form for Surgeon's Report, American Motorists Insurance Co., 02/04/1955, PPGNPR0090790; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 60-26, 08/08/1960, PPGNPR0090792-93; Notice of Disability Benefit Claim Filed and Request for Report of Wages, 01/16/1962, PPGNPR0090803; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 55-25, 04/15/1955, PPGNPR0090839-40; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-136, 07/19/1956, PPGNPR0090844-45; State of New Jersey, Accident Blank, Form "C," Claim No. blank, American Motorists Insurance Company, 07/19/1956, PPGNPR0090846; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-116, 09/27/1956, PPGNPR0091970-71; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-12, 01/13/1956, PPGNPR0091976-77; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 62-33, 08/01/1962, PPGNPR0091981-82; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 57-33, 01/01/1958, PPGNPR0091989-90; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 60-42, 12/3/1959, PPGNPR0091994-95; State of New Jersey, Employer's Report of Accident, Indemnity Insurance Company of North America, 12/19/1960, PPGNPR0091996-97; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 57-55, 06/07/1956, PPGNPR0092002-03; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 57-73, 10/18/1956, PPGNPR0092012-13; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 57-51, 10/19/1956, PPGNPR0092016; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 57-45, 06/00/1956, PPGNPR0092019-20; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 58-27, 11/00/1957, PPGNPR0092026-27; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-37, 02/23/1956, PPGNPR0092038-39; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 55-77, 10/21/1955, PPGNPR0092058-59; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-112, 09/19/1956, PPGNPR0092064-65; State of New Jersey, Accident Blank, Form "C," Claim No. blank, American Motorists Insurance Company, 09/19/1956, PPGNPR0092066; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 57-52, 12/00/1956, PPGNPR0092068-69; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-28, 02/06/1956 PPGNPR0092072-73; State of New Jersey, Accident Blank, Form "C," Claim No. blank, American Motorists Insurance Company, 02/06/1956, PPGNPR0092074; Standard Form for Surgeon's Report, American Motorist Insurance Co., 02/07/1956, PPGNPR0092075-76; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-18, 01/25/1966, PPGNPR0092078-79; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 55-88, 10/29/1955, PPGNPR0092084-85; Standard Form for Surgeon's Report, American Motorist Insurance Co., 11/04/1955, PPGNPR0092088-89; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 57-83, 08/22/1957, PPGNPR0092123-24; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 58-43, 07/15/1958, PPGNPR0092128-29; State of New Jersey, Employer's Report of Accidental Injury, Kemper Insurance, 07/21/1958, PPGNPR0092130; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 57-18, 09/15/1956, PPGNPR0092133-34; State of New Jersey, Accident Blank, Form "C," Claim No. 31CM 18552 M, Lumbermen's Mutual Casualty Company, 09/15/1956, PPGNPR0092136; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 55-73, 10/12/1955, PPGNPR0092138-39; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 55-5, 12/27/1954, PPGNPR0092142; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 57-10, 06/00/1956, PPGNPR0092154; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 57-76, 08/00/1956, PPGNPR0092158-59; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-72, 04/12/1956, PPGNPR0092162-63; Pittsburgh Plate Glass Company,

Doctor and Lost Time Injury Report, Case No. 59-4, 08/00/1958, PPGNPR0092172; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-157, 10/12/1956, PPGNPR0092177-78; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-31, 02/07/1956, PPGNPR0092181-82; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 55-83, 10/27/1955, PPGNPR0092187-88; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 57-57, 06/19/1957, PPGNPR0092195-96; State of New Jersey, Accident Blank, Form "C," Case No. blank, American Motorists Insurance Company, 06/19/1957, PPGNPR0092197; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 60-21, 02/00/1960, PPGNPR0092199-200; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-94, 08/07/1956, PPGNPR0092201-02; State of New Jersey, Accident Blank, Form "C," Case No. blank, American Motorists Insurance Company, 08/07/1956, PPGNPR0092203; State of New Jersey, Employer's Report of Accidental Injury, Indemnity Insurance Company of North America, 02/18/1960, PPGNPR0092205; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 60-31, 04/22/1960, PPGNPR0092225; Foreman's Report, PPGNPR0092226; Standard Form for Surgeon's Report, Indemnity Insurance Co. of North America, 10/18/1960, PPGNPR0092227; State of New Jersey, Employer's Report of Accidental Injury, Indemnity Insurance Company of North America, 10/19/1960, PPGNPR0092229; State of New Jersey, Accident Blank, Form "C," Claim No. blank, American Motorists Insurance Company, 02/08/1956, PPGNPR0092237; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 55-17, 02/25/1955, PPGNPR0092239; State of New Jersey, Employer's Accident Report, Kemper Insurance, 05/15/1959, PPGNPR0092242; State of New Jersey, Accident Blank, Form "C," Claim No. blank, American Motorists Insurance Company, 01/07/1956, PPGNPR0092244; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-136, 07/19/1956, PPGNPR0092253-54; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 57-100, 12/16/1957, PPGNPR0092257; Foreman's Report, PPGNPR0092258; State of New Jersey, Accident Blank, Form "C," Case No. illegible, New Jersey Manufacturers Casualty Insurance Company, 12/16/1947, PPGNPR0092260; State of New Jersey, Department of Labor and Industry, Kemper Insurance, 07/25/1959, PPGNPR0092262; State of New Jersey, Employer's Report of Accidental Injury, Kemper Insurance, 06/10/1959, PPGNPR0092264; State of New Jersey, Accident Blank, Form "C," Claim No. blank, Kemper Insurance, 10/02/1957, PPGNPR0092266; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-62, 04/26/1956, PPGNPR0092268; Pittsburgh Plate Glass Company, Doctor and Lost Time Injury Report, Case No. 56-22., 01/31/1956, PPGNPR0092271; State of New Jersey, Accident Blank, Form "C," Claim No. blank, American Motorists Insurance Company, 01/08/1957, PPGNPR0092277; State of New Jersey, Accident Blank, Form "C," Claim No. blank, American Motorists Insurance Company, 06/15/1956, PPGNPR0092279; State of New Jersey, Accident Blank, Form "C," Claim No. blank, American Motorists Insurance Company, 08/17/1956, PPGNPR0092281; State of New Jersey, Accident Blank, Form "C," Claim No. blank, American Motorists Insurance Company, 06/00/1954, PPGNPR0092283; State of New Jersey, Accident Blank, Form "C," Claim No. illegible, New Jersey Manufacturers Casualty Insurance Company, 03/23/1951, PPGNPR0092287; and Surgeon's First Report of Injury, File 31-CM-18160-M, American Motorists Insurance Company, 04/12/1956, PPGNPR0077063.